ZOE

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EDITOR:

TOWNSHEND S. BRANDEGEE.

ASSOCIATE EDITORS:

H. H. BEHR, KATHARINE BRANDEGEE, WALTER E. BRYANT, FRANK H. VASLIT, CHARLES A. KEELER.

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A BIOLOGICAL JOURNAL.

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NOTICES OF SOME CALIFORNIA BIRDS.

BY L. BELDING.

I believe the first specimen of the blue-winged teal *(Anas discors)* that was taken in California was a male in spring plumage that I found in the Stockton market late in February or early in March, 1881. This was forwarded to Prof. Ridgway for identification, and was mounted and exhibited in the Smithsonian Institution.

In April following, Mr. J. C. Parker, of San Diego, showed me another fine adult male which he said had been recently shot by a Mr. Hill in Cajon Valley, about fifteen miles from San Diego. The San Diego specimen was as much of a puzzle to the sportsmen of San Diego as my specimen had been to me. I had probably never seen the male in breeding plumage until I saw the Stockton specimen, but having shot a great many of these ducks in the fall in the Mississippi Valley, I supposed I was well acquainted with the blue-winged teal, and for that reason did not compare my bird with the description of the species. Had I done so its identification would have been easy.

Mr. F. Stephens secured a pair at Agua Caliente, San Diego County, in March, 1886. These are all the California records that I know of, although Dr. Newberry, in Vol. 6, Pacific R. R. Rep., says it is common throughout California and Oregon—referring especially to the central and northern part of California—but he must have intended to say this of the cinnamon teal *(A. cyanoptera)*.

Another of the very few species which I have collected and failed to identify was the harlequin duck *(Histrionicus histrionicus)*—a boreal species hitherto supposed to only winter in the State, which I first discovered in the Sierra of California in the summer of 1879, and probably the first specimen that was collected in California was a half-grown juvenile I shot in the Stanislaus River in 1880, and sent

to Prof. Ridgway for identification. In the summer of 1879 Dr. Fred. J. Huse and myself spent three very fatiguing days in following the deep rocky cañon of the north fork of the river, in search of new fishing ground, and in stocking the river with trout. I had stopped by a large deep pool, and he had gone a short distance up stream in a rocky gorge. While we were separated, a strange duck which he had probably frightened, but did not see, flew down the cañon and alighted within twenty yards of me, bent its neck forward close to the water, lifted its wings and uttered a scream I had never heard. A mountaineer who had not long before joined us was between me and the much-coveted duck, and I was unable to shoot at it until it had floated down the rapid stream so far as to be out of effective range. I yearned for a specimen of that duck until about a year later, when I visited the same locality and found a brood of half-grown young and shot three or four of them, including the above-mentioned juvenile which Prof. Ridgway identified. Since that time I have often seen these ducks in the Stanislaus River, and have occasionally seen them on other streams in that neighborhood, but have seen the young ducks only on the Stanislaus River, where they are latterly becoming rare, owing to their destruction by fishermen. Dr. Huse saw a female harlequin with a brood of ducklings on Griswold Creek in 1881 or 1882, and J. Clarence Sperry and Horace Pillsbury caught a juvenile from a flock of the same, which could not fly, on the same creek, in the summer of 1889. The most southern point where it has been captured in California is the south fork of the Tuolumne River, where I got two fine specimens—a male and female—May 15, 1891. The ovaries of the female were small—no larger than number one shot. The adult male breeding plumage I had not seen in the field until I got the specimens in the south fork of the Tuolumne River, near Crocker's Station. Latterly I thought these ducks might be a southern differentiated form of the harlequin duck, but these specimens—which now are a part of the California Academy collection—prove that such is not the fact. The only California Coast specimen that I have heard of is a fine male that was shot by Mr. Lewis Locke in Bodega Bay. Mr. F. H. Holmes, who informed me of it in 1885, said he had seen the specimen and examined the label, but had forgotten the date of its capture.

Dr. Coues, in *Birds of the Northwest*, published in 1874, says

it is found south in winter to California, but he gives no authority for the statement.

These ducks are very expert swimmers and divers, frequenting rapid mountain streams, where they are secured with great difficulty. They feed mostly upon aquatic insects; and the young ducks are quite palatable. I think they nest in rocks in this State, and perhaps in trees also, as they are said to do so elsewhere.

Probably the whooping crane *(Grus americana)* visits northern California in winter. In the fall of 1884, I suppose I saw a flock of about twenty of these birds flying over the tules on Butte Creek, Sutter County, and another flock of about the same number, April 15, 1891, near Gridley, Butte County. Both flocks were large white cranes, with black wing tips, and the latter flock was soaring in the manner of sand-hill cranes.

Mr. S. C. Phillips, who was with me when I saw the flock of this year, said he had several times seen the same kind of birds when hunting on Butte Creek. Mr. Anthony, in the *Auk* of April, 1886, mentions the occurrence of this species in Oregon.

Heretofore the Texan nighthawk *(Chordeiles texensis)* has not been found in California north of San Bernardino Valley, as noted by Mr. F. Stephens, who considers it a rare summer resident there, but I saw about a dozen of this species in the hills opposite Knight's Ferry, Stanislaus County, June 5, 1891, and shot and preserved one, which is in the collection of the California Academy of Sciences. I anticipated finding it here, as ever since June, 1885 —when I think I got (but lost) one of this species in the foothills below Grass Valley, Nevada County — I have thought it might be found occasionally to near the head of the Sacramento Valley.

The most satisfactory result of about a month's collecting along the Knight's Ferry, Big Oak Flat and Yosemite road, in May and June of this year, was the taking of three specimens of the Big Tree thrush *(Turdus sequoiensis)* in Yosemite Valley. I think—and Mr. Bryant agrees with me—that these specimens, with the types, put the species on a good basis. It arrives in this State in spring, after the dwarf thrush leaves it; is much more timid than the dwarf thrush; never jerks its wings as the latter does; never has been heard, by me, to utter the "chip," or "chip-chip," that the dwarf thrush so frequently utters when observed; is fleeter of

wing, less terrestrial, and is larger, paler and slenderer than the dwarf thrush.

I heard the song of the Big Tree thrush at Crocker's and in Yosemite Valley—suppose they breed at both localities.

At Crocker's a pair of Lincoln's sparrows *(Melospiza lincolni)* were probably breeding, as they were often in and about the garden during about three consecutive weeks.

I saw flocks of the evening grosbeak *(Coccothraustes vespertinus montanus)* at Crane's Flat, Gentry's, and in Yosemite Valley. One flock at the latter place contained about thirty individuals of both sexes as late as June 1.

I found the white-crowned sparrow *(Zonotrichia leucophrys)* rather common in Yosemite Valley, where it appeared to be a summer resident, but it and some other birds I found there may have been driven down to the valley by recent snow storms on the surrounding mountains. I was in the valley but five days.

I often saw a pair of the pygmy nuthatch *(Sitta pygmæa)* at Crocker's, where they were probably breeding in a dead oak limb. About June 25 following I saw two more in southern Oregon, near Klamath River. I so seldom see this bird on the west slope that I think these worthy of mention, and also the scarcity of the sparrow-hawk *(Falco sparverius)* wherever I have traveled this season. I counted but four between Stockton and Knight's Ferry —a distance of nearly forty miles—and about the same number between Knight's Ferry and Yosemite Valley. I have seldom seen it anywhere since the beginning of the year, though hitherto I have thought it a very common bird. Perhaps it has become rare by death from some disease.

ACOMYCES ON THE ALDER. The Acomyces mentioned on page 87 of the previous volume as abounding on the buckeye *(Æsculus Californica)* has been observed recently in Redwood Cañon, Tamalpais, on the leaves of *Alnus Oregana*, which was growing in close proximity to diseased buckeye. H. W. K.

THE INFLUENCE OF POLLEN UPON THE QUALITY OF THE FRUIT.

BY GUSTAV EISEN.

In 1884 a friend who follows the vocation of druggist suggested to me the cultivation of colocynth, the object being to supply the home market with the home-grown drug. I accordingly procured from a drug store several imported colocynths *(Citrullus colocynthis)* containing fertile seeds. In size these colocynths resembled small oranges, and were otherwise characteristic of the species. The seeds were planted, and the plants grew and produced fruit. Within a few feet of these colocynths I had also planted seed of the watermelon variety known as the citron-watermelon. When the colocynths bore I found that nearly all the fruit were hybrids between the colocynth and the citron-watermelon. That this hybridization had not been produced by a previous pollination between the two species was evident. The fruits on the colocynth plants were not equally affected. Some were small, almost like their parent colocynths, others again two or three times larger, and some again as large as the citron-watermelons, all partaking more or less of the characteristics of the citron-watermelon. The new fruit was neither sufficiently bitter, nor would it dry readily, and it was accordingly worthless as a drug.

As the seeds came from imported colocynths, and as the fruits were unequally affected, there remains only one explanation of the cause of the hybridization. The pollen of the citron-watermelon had been transferred to the colocynth flowers and affected the fruit the same season.

Similar instances are not very rare. A friend informs me that at some places in San Diego County it is difficult to produce good muskmelons, on account of the number of native wild cucurbitaceous plants abounding in the vicinity. These native gourds are probably *Cucurbita palmata* and *C. perennis*, very different in appearance from the cultivated muskmelons. The melons produced on the latter are affected by the pollen from the wild species, producing unpalatable fruit.

THE COMMON SHRUBS OF SOUTHWEST COLORADO.

BY ALICE EASTWOOD.

At all seasons of the year the shrubs are the most noticeable part of the vegetation through Southwestern Colorado. Most of them are conspicuous not because of brilliant flowers and beautiful foliage, but for the reason that over large sections of country they form about the only vegetation that is not dried into dust by the hot summer days.

For miles and miles the adobe plains are covered with a carpet of bluish green which at a distance might be mistaken for grass, but upon a nearer view it is seen that black sage *(Artemisia tridentata)* almost monopolizes the soil. However, greasewood *(Sarcobatus vermiculatus)*, rabbit brush *(Bigelovia graveolens)*, and salty sage *(Atriplex canescens)* become almost as common in scattered spots. Generally they are not much more than a foot high, but in favorable localities they often become eight or ten feet. In the winter, when the ground is covered with snow, they form the main subsistence of the cattle that roam at will over the land.

Early in June, however, the hills and mesas seem suddenly to burst into bloom and the air is perfumed with the fragrance of myriads of flowers. *Peraphyllum ramosisimum* is one of the earliest. Its beautiful clusters of pinkish flowers are followed by the queerest little bitter apples, commonly called "squaw apples." This year the small bushes were loaded with fruit, but last year the late frosts destroyed almost all. Towering above every other shrub *Fendlera rupicola* exalts its flowery stems as if the delicate white flowers and pink buds were too etherial for the common air below. All its beauty is for the sun and stars. The earth looks upon rough scraggy stems, without even a leaf to cover their ugliness. The wood is exceedingly hard, dark colored and susceptible of a high polish. It is named ironwood, and may some day be used in the arts. Service berry *(Amelanchier alnifolia)* is also in bloom at this time and adds its snowy flowers to the hillside bouquet. *Purshia tridentata* and *Cercocarpus parvifolius* are common, but their flowers being almost the same color as the foliage, escape general attention. *Quercus undulata*, however, has already put forth its early leaves and the dense thickets glisten in the sunshine, the fresh light green foliage, with its glossy sheen, seeming almost transparent. *Philadelphus*

microphyllus, which looks like a small-flowered, diffusely-branched Fendlera, is found upon rocky hills and abrupt cañon sides.

Along the river bottoms, though the shrubbery is dense, the flowers are generally dull in color and small. *Cratægus coccinea*, however, rivals any of the hillside plants. Its lovely corymbs of white flowers with red stamens are very fragrant, and the brilliant scarlet berries that succeed them are set off to perfection by the shining leaves. Alders and willows are abundant. I noticed four kinds of willows—*Salix lasiandra*, *S. longifolia*, *S. cordata* and *S. cordata* var. *Mackenziana*. Occasionally clumps of *Rhamnus Californica* are met with. An ordinary observer would pass them by if they were not in fruit. Some years they are very prolific, the purple berries compensating by their beauty for the dullness of the flowers. I have examined berries on every bush as I passed, and have found none with three seeds, though they are described as two or three-seeded. *Rhus aromatica* is found everywhere and is common to both the eastern and western slopes of the Rockies. But of all the river shrubs there are none to compare with the Buffalo berry (*Shepherdia argentea*). Far in the distance it can be discerned with its silvery leaves shimmering on the swaying branches. It blooms in early spring, but does not owe any charm to the beauty of its flowers. In fruit it is gorgeous. The bright red or yellow berries surround the stem and form a vivid contrast with the pale green foliage. In early days, before fruit-raising was an assured success through this region, the buffalo berries were a great luxury to the pioneers. Even now, with an abundance of strawberries, blackberries, raspberries and currants, they are prized by the housewives for jelly and wine.

Among other wild fruits common in the section the choke-cherry (*Prunus demissa*) and the currant (*Ribes aureum*) are most widely distributed.

In the high mountains the shrubs are neither peculiar to the region nor so noticeable as the trees and herbs, but among those found near the base of the foothills are some that are uncommon or wanting in other sections. *Berberis Fendleri* is most conspicuous and most beautiful. Its upright stems seem to be in bloom all at once, and the clusters of yellow flowers extend from near the ground to the very top without any interruption. It is a golden wand covered with tiny bells that send forth faint music with every breath of

air. *Berberis repens* is also found here and is common through the entire Rocky Mountain system. *Pachystima myrsinites* carpets the ground under taller shrubs, almost concealing its tiny purple flowers by its glossy leaves. *Ceanothus Fendleri* is common in open spots on rocky slopes, but *Ceanothus ovatus* is less often met with. These low plants with small clusters of white flowers do not begin to compare in beauty with their California relatives.

These observations have been confined chiefly to the valleys and cañons of the Mancos and Animas rivers. Undoubtedly there are many other shrubs which I have never seen that ought to be noticed, but from a careful comparison of Mr. Brandegee's descriptive "Flora of Southwestern Colorado" with my own observations, I think that I have included those that have the widest distribution.

DENVER, COLO.

UNUSUAL NESTING PLACE OF *EMPIDONAX HAMMONDI.*

BY DR. J. G. COOPER.

The tendency to seek the protection of human habitations during the season of nest-building is well known to characterize many kinds of birds of very different families, and in other respects, different habits. The motive impelling them to seek shelter in human habitations for their progeny is, doubtless, a feeling of greater safety there, both from the weather and from living enemies, than they can find elsewhere.

Wild birds seem to have no fear of man until they have learned by experience that he is sometimes dangerous, and visitors to lonely islands tell wonderful tales of the tameness of the birds, both on their nests and off of them.

There are also other motives for choosing houses to nest in. Such species as have been accustomed to building in caves and hollow trees find the best substitutes for such homes in or around houses. Others find their food most abundant in the gardens or orchards, and sometimes may be attracted by the flies and other insects, such as spiders, which nearly all feed to their young, even if unnoticed at other seasons.

It has been observed also that in some Eastern States where the killing of small birds is forbidden in populous districts, the birds soon find out where such laws protect them and flock to the country

towns especially to build, even deserting the woods, and building nests in most unusual and unexpected places about houses. An instance of very extreme departure from original habits is that of the European stork, which for several centuries has built on the chimney-stacks of cities, being driven to them by the increasing scarcity of suitable tall trees, and protected by a commendable superstition, as the bringer of good luck to the inhabitants.

There is no doubt that with some protection, many useful birds will become thus semi-domesticated, and be really sources of good luck through their destruction of insects, as well as giving pleasure by their songs.

The instance I now describe is one in which the bird is among our rarest species near the coast, and also of a timid, shy, nature, being generally found in retired shady groves.

The family of flycatchers to which this bird belongs is, however, known to have some very sociable members, which build in barns, under porches, bridges, etc., as substitutes for the hollow trees and caves which they occupy in favorable places. These belong, however, to other genera, containing larger species, and probably *never* build in or on branches of trees, or in their forks, like those of this genus. The arboreal residence characterises nearly all of the genus Empidonax, of which nine or ten species and subspecies inhabit the United States in summer.

The chief exception is in the western yellow-bellied flycatcher (*E. difficilis*), which often builds in a hollow tree or branch, a slight cavity in the bark, a hole in the bank of a stream, under a bridge, or in a shed or barn; probably never in a forked branch. This then is the most likely to resort to houses to build, and as it is the commonest summer species in the coast counties, such an event may be expected, though not yet reported. All the numerous nests of it seen by me were near running streams, and in well-shaded spots. That it is not more familiar in such localities makes the occurrence here reported still more remarkable.

Hammond's flycatcher seems to be the most timid as well as smallest of the genus found in California (smaller than the so-called "little" flycatcher). Its most frequent residence appears from all accounts to be the pine woods of the most eastern ranges of mountains (west of the Mississippi), but it has been collected at Monterey. In the Ornithology of California I confused it with the little fly-

catcher (*E. pusillus*), their habits being very similar and the birds not distinguishable at gunshot distance in a shady grove. It doubtless builds at times in the pine woods near Santa Cruz, where my collections of nests and eggs were made in 1866, but at that time the difference in the eggs of the two was unknown. In Proc. Cal. Acad. Sci., vol. vi, p. 199, I made some corrections of this error, but think the nests and eggs collected were partly of the yellow-bellied as well as of the little flycatcher, their eggs being scarcely different, either in size or pattern of spots.

As is now well known, those of Hammond's species differ in being pure white, and I may state that during four years, when I collected nests and eggs around Haywards, I never but once obtained a probable egg of the species, and then the positive evidence of the bird itself was wanting, as a boy brought me the egg and could give no account of the bird.

In the present instance I noticed a pair of birds about the garden for a week or more before finding the nest. As no creek is within 300 yards of the house I did not suspect the birds of building there, but now think they may have chosen the location on account of its dryness and also the presence of several pine and cypress trees. As if to escape all chance of wetting by the rather late rains, they chose the driest spot they could find for the nest, for on June 11 I found it, by seeing the bird fly off. And for a very timid bird it built in a strange place, on top of a pilaster supporting the roof of the porch close to the front door frame and only eight feet high! A flat ledge there, four and a half inches square, formed more than enough room for it though a few straws hung over the edge. Unfortunately the eggs were hatched already, and two young only were in it, not a fragment of egg-shell to be found.

The base of nest measures 4½ inches long and 3¼ wide; the cavity 2 wide and 1¼ deep, which is much smaller than those of the other species I measured. It is 2 inches high, the base of coarse grasses, cobwebs, a bit of lace and one green leaf, then some stiff plant-stems, green and dry grasses, a few feathers, leaves and more lace, with a thick lining of finer grasses and thread-like fibers, from decayed pine leaves. Unlike the nests of the other two species mentioned, no green moss was used in this. Neither was there any earthy material, which sometimes becomes wet and looks like mud used in their construction.

I had by close observation of both the birds become nearly satisfied by this time of their being Hammond's flycatcher, but to make sure I captured one of them at night on the nest, and taking it in the house compared it with the description in the "North American Birds." To avoid frightening them away I did not make any measurements, but satisfied myself of its identity in colors. Only one item was badly marked, as noticed then and by daylight also, the almost entire absence of a yellow tint underneath, though this is mentioned as very faint in summer adult birds. A decided notch in the tail could be seen at some distance, a character best marked in this species. For greater certainty I afterwards examined the fine series of west coast species in the Academy's collection, including the two new ones lately described from Lower California, and was convinced that my birds could be no other than *E. hammondi.*

To my great regret the parents were both gone the next day, and near night I found that the young had been deserted and were almost dead. As a last chance I put them in a nest of the Arkansas goldfinch in which three young were just hatched, but they disappeared next day. I heard the old birds a few times afterwards in the vicinity, but not later than about July 1. Their few faint chirps and lisping calls resembled those mentioned by authors, who have described the species.

LIST OF MOSSES COLLECTED BY T. S. BRANDEGEE IN THE YAKIMA REGION OF WASHINGTON, 1882–3.

(Determined by L. M. Underwood and O. F. Cook.)

Gymnostomum calcareum Nees & Hornsch.
Dicranum fuscescens Turn. Cascade Mountains.
Dicranum montanum Hedw.
Dicranum strictum Schleich.
Pottia cavifolia Ehrh.
Leptotrichum tortile Müll.
Barbula amplexa Lesq.
Barbula ruralis Hedw.
Grimmia anodon Br. & Schimp.
Grimmia apocarpa Hedw. Cascade Range.
Grimmia alpestris Schleich.

Grimmia Donniana Smith.
Grimmia Montana Br. & Schimp.
Grimmia Scouleri Müll.
Racomitrium patens Hübn.
Hedwigia ciliata Ehrh., var. *leucophæa* Schimp.
Orthotrichum sordidum Sull. & Lesq.
Orthotrichum speciosum Nees.
Orthotrichum Texanum Sull. Cascade Range.
Encalypta vulgaris Hedw.
Tetraphis pellucida Hedw. Cascade Range.
Funaria hygrometrica Sibth.
Bartramia ithyphylla Brid.
Philonotis fontana Brid.
Philonotis fontana Brid. var.
Leptobryum pyriforme Schimp.
Webera cruda Schimp.
Webera nutans Hedw.
Bryum cæspiticium L.
Bryum cirrhatum Hoppe & Hornsch.
Bryum Hendersoni Ren. & Card.
Bryum pallens Swz.
Mnium affine Bland. Cascade Range.
Mnium punctatum Hedw.
Timmia megapolitana Hedw.
Polytrichum piliferum Schreb. Cascade Range.
Polytrichum juniperinum Willd. Cascade Range.
Fontinalis Lescurii Sull.?
Fontinalis Neo-Mexicanæ Sull. & Lesq.?

THE RECIPROCAL INFLUENCE OF STOCK AND SCION.

BY GUSTAV EISEN.

The following instances of the influence of stock upon scion, or *vice versa*, have come under my personal observation. They clearly show that there exists a strong reciprocal influence between scion and stock, which, when more fully understood, may be of practical value in the artificial production of new horticultural varieties.

Some ten years ago I had in my garden a Mandarin orange tree, budded on sweet California stock. This stock is simply pro-

duced by sowing the seed of any of the commercial oranges, and the seedlings are afterwards budded with improved kinds. If any of these seedling are allowed to fruit as seedlings, the fruit will be found to more or less resemble the parent orange; that is, it will be of fair or large size, with sweet meat and thick skin—the seedling orange of our markets.

The Mandarin orange in question was a little tree, nine feet high and quite bushy, and had borne a good crop of oranges for at least five years. Its oranges were characteristic of the Mandarin variety—small, round, compressed, and with the skin peeling off like a glove—hence the name "Kidglove orange," under which this and similar varieties are known.

One winter we had a heavy frost and the Mandarin was greatly injured. When the time for making new growth came I found the top almost dead, and only one feeble shoot coming out above the bud. The remainder of the top died, and was cut off in order to save the new shoot. This grew rapidly, and at the end of the season had attained the full height of the old tree, with several large side branches. But the leaves of the new standard did not resemble the leaves of the old Mandarin tree, but were quite similar to those of a common sweet seedling orange. So much did they resemble the sweet stock that I thought, and continued to think for some time, that all of the Mandarin part of the tree had been killed, and that the new tree was produced from below the bud.

Next year the tree produced fruit in size and quality intermediate between a sweet seedling and a Mandarin—much more resembling a sweet seedling, only distinguished by its smaller size; which, however, was several times larger than a large Mandarin orange. The meat and skin showed every characteristic of the common sweet orange. The year following the leaves became smaller, and the oranges almost identical with the original Mandarins. The third year the fruit and other parts of the tree had regained all their Mandarin characteristics. Ever since, this tree has produced Mandarin oranges of the same size and quality as before it was injured by frost.

My theory of the change from one variety to the other is simply this: The frost killed the largest part of the Mandarin tree, only one bud surviving. The shoot produced by this bud was so influenced and overpowered by the strong sweet seedling root that it

lost part of its own characteristics, which were only regained gradually as the Mandarin shoot became more vigorous and could exert its old influence over the root.

About twelve years ago my attention was called to a very large grapevine of the variety known as Flaming Tokay, which had been grafted on the wild grapevine of California — *Vitis Californica.* The vine must have been some ten years old, and covered part of a veranda with luxuriant foliage, and large annual crops of its characteristic and magnificent flame-colored bunches. From the root of this vine, and as it was afterwards ascertained, several inches below the graft, a shoot had sprung up which partook of the peculiar characteristics of both the graft and the root. The new shoot was, as regards leaves, intermediate between the Flaming Tokay and the Californica. The next year this shoot-branch produced fruit which also showed characteristics of both varieties, but which much more resembled the Californica than the Tokay, and accordingly proved of no particular value. Some cuttings of the new sport were propagated and produced a similar hybrid grape, but as far as I know no attempt was made to seed the new grape. According to my theory the old Flaming Tokay grape exerted a large influence on the *Vitis Californica* root on which it was grafted, and the sport produced was a sap-hybrid between the graft and the stock.

In 1886 I had occasion to assist a friend in grafting a number, one hundred or more, of Sultana grape vines which he desired to change to Muscatel Gordo Blanco, like the remainder of the vineyard. The Sultana vine has large pale green leaves, long slender shoots, and large compact bunches of very small berries. The Muscat is the opposite of this: leaves medium, deep green, short branches, and bunches compact and berries large. The Sultanas were cut down several inches below the ground and the Muscatel graft inserted, leaving no branch of the Sultana. The work was all very carefully done, and the grafts all "took." Two months later I went over the vines, only to find to my astonishment that all the tops of the vines were Sultanas, or apparently so. Upon examination, however, I found that all the grafts had taken, and that there were few if any shoots from the roots. My idea was then that the grafts had been mixed up, and that we had inserted Sultana grafts in Sultana stocks. However, as the vines grew I found a

few months later several bunches of berries which in shape and size exactly resembled the Sultana, but which had a distinct and strong Muscatel flavor. Everything else about the vine, such as color and shape of leaves, size of branch, distance between the leaves, etc., was entirely characteristic of the Sultana. The following year the grafts began to regain their Muscatel characteristics, and the third year they had done so entirely, producing a good crop of Muscatel grapes.

I had in the meantime inquired among the other grape-growers, and inspected a large number of lately grafted vines. The variety that had been mostly grafted were Zinfandel vines, and the grafts were uniformly those of Muscatel. I found that several parties had made observations similar to my own, and saw here and there young vines which partook of the characteristics of the stock and the graft. Muscatels grafted on Zinfandel resembled that variety as to leaves, branches, and shape and size of berry and bunch, but never as regards color of berry and aroma. The color was always green, and the aroma Muscatel-like. In one or two seasons later these grafts had all lost their Zinfandel characteristics and produced regular crops of Muscatel grapes.

An explanation I believe is hardly necessary. The sap from the Zinfandel and Sultana roots respectively had during the first season so influenced the graft that it had partaken of most of the characteristics of the stocks. Only as the scions grew did they gain in strength, throw off the influence of the stock, and regain their characteristics as Muscatel grapes.

It is needless to say that the reciprocal influence between stock and scion may be taken advantage of in producing new varieties with valuable qualities. The hybrid grafts may either be propagated by themselves, if sufficiently valuable, or the fruit produced on them may be seeded and the new seedling watched for valuable characteristics. The frequency and facility with which grape scions partake of the characteristics of the stock is especially interesting, and should greatly facilitate the production of new varieties of greater economic value. I will here only point out the desirability of getting a hybrid between the "Muscatel" and the "Malaga" grapes, and the possibility of producing it by sap hybridization.

THE FERTILIZATION OF GERANIUMS.

BY ALICE EASTWOOD.

There are three species of Geranium common in Colorado — *G. Fremontii*, *G. Richardsonii* and *G. cæspitosum*. The first two are found through the mountains and valleys of the whole State and vary considerably; the last seems to be restricted to Southwestern Colorado. When the flower expands the pistils are erect and somewhat convolute, while the stamens curve backward, the versatile anthers hanging downward so as to discharge the pollen at the bottom of the petals, instead of on the stigmas. When the anthers are empty, the stamens become straight and the pistils curve backward. The styles are stigmatic along the inner and afterwards the upper edge, so that self-fertilization would seem impossible. However, the hymeneal insect comes to its relief, and whether it is a bee, beetle or fly seems not to matter in the least. Between each petal, at the very base, is a small gland on the receptacle from which a drop of honey can be seen to exude. In seeking the sweets, the insect unavoidably becomes a bearer of pollen to the next flower that it visits. I have seen flies alight first upon the expanded pistils with legs dusted with pollen, and again I have observed them crawling at the base of the flower, with difficulty making their way among the viscid hairs on the corolla and unconsciously gathering the grains of pollen that had fallen from the open anthers. On the same plant may be found flowers in all stages of development, so that undoubtedly cross fertilization prevails exclusively among the wild Geraniums of Colorado.

DENVER, COLO.

NOTES ON THE LAND MAMMALS OF CALIFORNIA.

BY WALTER E. BRYANT.

Since the publication of the provisional list of the land mammals of California, which was intended as a beginning for a catalogue of the known mammals of California with their life histories, several important changes have occurred and are to be noticed here. Several species were included upon the authority of the earlier writers, and in the present imperfect state of our knowledge upon the dis-

tribution of the species it would be inadvisable if not unjust to eliminate as yet such species as *Didelphys virginianus californica* (Bennett) Allen, and *Hesperomys (Vesperimus) aztecus* (De Saussure) Allen.

The *Forest and Stream* notices an oversight by which the mountain or white goat (*Mazama montana* Ord) was omitted. This species was found as late as 1868 in Inyo County by Capt. Charles E. Bendire, and Dr. Merriam has obtained evidence of its occurrence on Mt. Kearsage. Probably some of the parties from the Department of Agriculture now at work in that region will obtain new information regarding the present existence of the white goat in California.

Messrs. John Fannin and George Bird Grinnell, in their exhaustive account of the species, cite the probably occurrence of this goat in eastern Lassen County (Granite Creek Mountains), near the Nevada line. If such should prove to be correct, it adds an important link to the chain which probably once connected the extreme southernmost known point (Inyo County) of the animals' range along the Sierra Nevada Mountains into Oregon. The deer which the *Forest and Stream* believes should have been included is perhaps the unestablished variety of *Cariacus macrotis* from the Coast Range of southern California, mentioned by Judge Caton as "differing in important particulars from those found east of the Sierras."

Some species will probably have to be eliminated, as *Sciurus hudsonius fremonti*, *Dipodomys phillipsi*, and others not yet determined, while the following three have since been described: *Atalapha teliotis* H. Allen, from a specimen supposed to be from southern California; *Histiotus maculatus* Allen, taken in Ventura County, and *Perognathus (Chætodipus) femoralis* Allen, from Dulzura, San Diego County. There is also to be added *Sorex pacificus* Baird, now known to occur in California, and I have several specimens of another unidentified *Sorex* from the vicinity of San Francisco, which will require to be added. *Neurotrichus gibbsii* (Baird) has been taken in Marin County by Mr. C. A. Allen, so Prof. T. S. Palmer informs me.

The lynxes found in this State, Dr. Merriam considers, are *Lynx fasciatus* Raf., and *Lynx baileyi* Merriam, which was first described

in North American Fauna, No. 3, from the lynx of San Francisco Mountains, Arizona.

For reasons for changing the generic name *Hesperomys* to *Vesperimus*, and the specific name *leucopus* to *americanus*, consult Dr. J. A. Allen in Bull. Am. Mus. Nat. Hist., III, 2, article xx.

THE INTRODUCTION OF BLASTOPHAGA PSENES INTO CALIFORNIA.

BY GUSTAV EISEN.

One of the most important events in the history of California horticulture has just taken place. The living *Blastophaga psenes* was received in California the 25th of July this year, and was at once placed on the caprifig trees in Mr. James Shinn's orchard at Niles.

In 1882 I first called the attention of the fig-growers of this State to the real cause of the failure of the true Smyra fig to mature its fruit, and since that time I have had occasion to refer to this fact repeatedly.

The cultivated edible figs contain, with a few and very rare exceptions, only female or pistillate flowers. The majority of fig varieties mature their fruit without being pollinated by male flowers, but a few—and among them the Smyrna varieties, the best ones for drying—do not, or only rarely, mature fruit without having previously been pollinated. As the cultivated fig varieties have no male flowers, the wild or caprifig *(Ficus carica)*, which possesses such flowers in abundance, has been made use of to furnish the pollen necessary to bring the female flowers to development. This practice is very old, and is as yet in vogue in Asia Minor, Sicily and other Mediterranean countries. As the male flowers and their pollen are enclosed in a large receptacle, it is evident that the pollination cannot take place by the aid of the wind or by insects generally. As far as the caprifig is concerned, only one variety of insect is of any practical value in transmitting the pollen to the female figs. This insect is the minute wasp known as *Blastophaga psenes*, which inhabits the caprifigs, and here produces three broods yearly, or one each for the various crops of caprifigs. The caprification of the figs consists in hanging caprifigs on the branches of the culti-

vated figs. Soon the Blastophaga hatches out, and, seeking for new figs in which to lay its eggs, enters the female fig, and in so doing conveys the pollen from the male to the female flower, which causes the latter to develop seed and produce perfect fruit.

The insects just received were sent directly to Mr. James Shinn from Lokia, in Smyrna, by Mr. J. Bliss, a missionary. The little box containing a dozen caprifigs, of the size of a very small walnut, left Smyrna the 2d day of July. They must have been picked at least two or three days previously. The box arrived in New York the 18th of July, and the 25th of July in San Francisco. The next day Mr. Shinn called on me and I at once started for Niles. The largest caprifig tree in the State grows there. It was imported from Smyrna some ten years ago by the San Francisco Bulletin Co., and has borne fruit for years. Upon opening the box of caprifigs I found that thousands of Blastophagas had already hatched, the greater number were dead, of course, but many were alive and lively, and some were just hatching out. I cut the figs open in order to assist the insects in their exit. This I found was very necessary, as the figs had been somewhat compressed and it had become impossible for them to escape. One or two figs which had not been injured showed a small round puncture in the eye, through which the Blastophaga were escaping. A great many had not hatched. The box had been suspended in the caprifig tree by Mr. Shinn already several hours before my arrival and many Blastophagas had escaped. That they already were hunting for new quarters was evident, as in opening several young Smyrna figs in adjoining trees I found that the insects had already entered them.

From our present experience it is safe to say that the importation of Blastophaga into California is easy, or not by far so difficult as we first had imagined. In twenty-five days from Smyrna the caprifig reached us safely, and during that time numerous galls remained unhatched.

Blastophaga psenes is about a line long and looks much like a slender ant with wings. The caprifig is, when dried without pressure, less than an inch in diameter, and the mouth is more prominent and open than in cultivated figs.

NOTES ON CALIFORNIA PLANTS.

I.

Tuberiferous roots of Hydrocotyle Americana Kellogg.

BY S. B. PARISH.

Three of the North American species of Hydrocotyle within recent years have been ascertained to be tuberiferous. Attention was first directed to this character in *H. Americana* by Dr. George Vasey,* and subsequently these organs were thoroughly studied and described by Mr. Theodore Holm.† Recently Dr. Coulter, in characterizing *H. umbellata* and *H. prolifera*, states that their roots are tuberiferous.‡ No account, however, is given of the manner in which the tubers of these two species are produced.

The method of their development in *H. prolifera* is quite different from that of the same organs in *H. Americana*, although in fact essentially similar. The latter species grows by means of terrestrial runners from which arise the flowers and leaves and whose axils develop slender subterranean stolons, consisting of a few internodes, bearing at each node a scale-like leaf and terminating in an oblong tuber. Both runners and stolons emit at the axils thready roots.

The stems of *H. prolifera*, on the contrary, all creep beneath the soil. They occupy the sandy or muddy margins of streams and ponds, or other wet places. From the nodes arise solitary short petioles, supporting a peltate blade. The plant is very floriferous, nearly every axil producing its umbel on a stem usually shorter than the petioles. The stolons themselves are slender whitish organs, the internodes seldom more than half an inch long, and the nodes sending out abundant capillary roots. If these are removed from a growing plant the node is seen to consist of a narrow annular enlargement, not exceeding one-quarter the diameter of the stem. So long as the plant continues to vegetate this condition is maintained, and no further nodular enlargement ensues. In this climate, according to my observations, if the ground remains sufficiently wet it never occurs, the plant continuing to grow through-

*Bull. Torr. Club, xiii, 28.

†Proc. U. S. Nat. Mus., xi, 455.

‡Rev. Umb., 134. Manual Western Texas, 149.

out the year without the production of tubers. When, however, by reason of the drying of the soil as summer comes on, the growth of the plant is checked, the annular process of the nodes rapidly increases, becoming eventually an irregular spheroidal tuber, sometimes a quarter of an inch in diameter. The leaves now turn yellow and wither away, the substance of the internodes is absorbed and they decay, and the tubers alone remain to produce a new growth with the coming of another wet season. The tubers consist of an aggregation of starch cells contained in a thin cuticle and are without odor or taste other than the peculiar starchy flavor of raw potatoes.

While, as has been said, there is an apparent difference in the manner in which the tubers are produced by the Eastern and the Western species, a closer examination shows that they are essentially the same. In the latter case they are enlargements of the nodes of the stolons, while in the former they are terminal at the extremity of thread-like stolons emitted by the superficial runners. But, as Mr. Holm has pointed out, the thready stolons are merely modifications of the creeping stems, as is shown by their nodular scales which replace the normal leaves. The terminal tuber itself is an agglutination of two or more enlarged nodes, as is indicated by the bracts at the more enlarged portion, the less swollen part representing the internode, while the bud at the apex shows that the growth of the stolon has simply been arrested. From this it results that the form of the tuber of *H. Americana* is oblong, or fusiform, while in the Western species it is spherical. Moreover, in *H. prolifera* all the internodes perish, while in the other species a single one is shortened and enlarged, and makes a part of the tuber. To the tubers of the former plant, also, the scales and the terminal bud are lacking, the first because the leaves which they represent have developed and decayed, and the latter because the tubers do not include the germinal apex.

Furthermore, the production of tubers in *H. Americana* is regular, and all the other parts of the plant are destroyed by the rigors of winter. In *H. prolifera*, at least in this mild climate, it is occasional, and dependent upon the supply of moisture, so that they are produced only when the plant is unable to continue its growth. This special provision for its preservation is the more remarkable since our species is an abundant seed producer.

THE VEGETATION OF "BURNS."

BY T. S. BRANDEGEE.

The forests of the States west of the Mississippi River are composed mainly of Coniferæ, a family of trees so constituted that they furnish much inflammable material for a forest fire, when once under full headway. In the western part of Washington and Oregon, the woods are almost entirely made up of cone-bearing trees, among which the Douglas fir usually predominates, and the undergrowth is composed largely of Ericaceæ with species of mosses covering the ground beneath. Forest fires are not unknown there, but on account of the damp climate and its consequent vegetation they are much less common than in the drier regions of California and the interior.

The open forests of Colorada and Montana are composed of yellow pine *(Pinus ponderosa)* with a sprinkling of the Douglas fir, and are often endangered by fires which run through them, burning the grass, the underbrush, the fallen dead limbs and trunks, but without injuring the trees themselves, excepting the thin-barked young ones. The Douglas fir, yellow pine, and a few others, will stand without injury a fire hot enough to blacken them many feet up their trunks, while the hemlocks and spruces *(Tsuga* and *Abies)*, are killed by a slight fire at the surface of the ground about the base. Their inability to withstand heat arises from the fact that their bark is much thinner than that of the Douglas fir, yellow pine, Sequoia, etc. The trees of these forests, killed by a fire and becoming dry afford abundant material for a much hotter conflagration in succeeding years, when everything that may have escaped destruction at first is burned to the ground.

The redwood trees of the forests of the northern coast of California when killed or burned to the ground, send up a multitude of new shoots from their roots and soon surround the old stumps with a new luxuriant growth, from the center of which the parent stump in time entirely disappears leaving only the beautiful circular grove characteristic of this species of Sequoia.

The destroyed forests of Douglas fir of the coast region of Oregon and Washington are after a time replaced by a host of young seedlings that grow rapidly; but in the interior, a dry climate, the destructiveness of cattle and sheep, the sensitiveness of the young

trees to slight fires, prevent a renewal of original forest growth. In the high, mountainous portions of these regions, the forest contains much hemlock or spruce and small trees of Douglas fir—trees easily killed by the fires which readily ascend the steep slopes. These mountainous regions, excepting where the soil deprived of the protection afforded by vegetation may have been washed away by rains, are more certain to be covered with a new tree growth than regions of less altitude, but the new growth is not always at first that of the original forest. Fire usually seems to destroy, in the mountain regions, the seeds of conifers, for certainly seedlings do not appear immediately upon the locality of a burned forest, but gradually the original growth is replaced under the shade and protection of bushes, aspens, etc., but the ground of a forest cut by the axe soon produces young trees, unless, as so often happens, fires burn the debris left by the wood-chopper.

The Coast Range of California, south from San Francisco, excepting the redwood forests and occasional groups of other conifers, is not distinctively a forest region, but its hills and mountains are covered by a thick, almost impenetrable growth of *Adenostoma fasciculata*, commonly called "greasewood" or "chamis," manzanita, Garrya, oak, Ceanothus (California lilac), etc., which seems to be periodically destroyed by fire. Indeed, it is almost impossible to find a hill or mountain covered with bushes, even of great age, where some old charred ends of roots may not be seen, showing that at some previous time they had suffered from fire.

This year, on Mt. Tamalpais, near San Francisco, an extensive fire destroyed again the vegetation of part of the mountain slope, from which everything green had been burned several years ago, and to-day, in the burned district, not a single bush or plant can be found, excepting along the edge of the wagon-road; in the damp gulches and on the northern slopes. Last year a similar fire swept through the vegetation upon that part of the mountain known as Bolinas Ridge, destroying everything green, leaving the ground black and with only upright remnants of charred manzanita and oak to show where the larger bushes had grown. This year, during the early part of the season, this ground was green with a rank annual vegetation, composed mostly of species common in the neighborhood of San Francisco, all growing much larger and ranker than usual. The perennial plants and bushes are re-appear-

ing, and in a few years, doubtless, the mountain side will be clothed with its former vegetation, and the annuals now so abundant will be found only along trails and in openings under the shade of bushes. The nutmeg *(Torreya California)*, manzanita and the huckleberry *(Vaccinium ovatum)* send up new shoots from the old roots, as does also the madroño *(Arbutus Menziesii)*, which requires more heat to injure it than oak bushes. "Chamis," which formed a large part of the original "chaparral," comes up from the old roots so strong that the new shoots often blossom the first year. Oaks, chinquapin *(Castanopsis chrysophylla)*, hazel *(Corylus rostrata)*, Christmas berry *(Heteromeles arbutifolia)*, all renew themselves in the same manner, and almost all the woody plants seem to re-appear from their blackened roots. The tree poppy *(Dendromecon rigidum)*, however, seems to spring from the seed, and I saw none excepting seedlings, still retaining the early lobed form of leaves, although some of them had grown to a height of two feet. Helianthemum, a low perennial from a woody base, is killed by fire, but its seeds spring up everywhere, and the young plants bloom freely as annuals. The painted cup *(Castilleia)*, the wild morning-glory, the wood balm *(Sphacele calycina)*, *Hosackia glabra*, yerba santa *(Eriodyction glutinosum)*, somewhat woody perennials, also spring again from the old roots. The latter certainly also becomes conspicuous as a seedling, and probably many seeds of most of the perennials begin to grow, but do not become large enough in one season to be noticed. Cascara sagrada *(Rhamnus Purshiana)* grows again from its old roots, but I saw none of its near relative, the California lilac *(Ceanothus)*, excepting hosts of seedlings two or three inches high. *Zygadenus Fremonti* is so abundant and rank that, as it is not an annual, the question arises: where was it before the fire?

The most interesting part of the vegetation is the annual growth. The Mayweed *(Anthemis cotula)*, *Claytonia perfoliata*, *Sisymbrium reflexum*, *Silene Gallica* and *S. antirrhina*, *Barbarea vulgaris*, *Hosackia*, etc., are common and large. Some others, such as the milk thistle *(Silybum Mariannum)*, abounding in the State, are not present, and the native Compositæ, considering the facility for distribution that their seeds afford them, are poorly represented. *Campanula exigua* is a small plant discovered by Mr. Rattan on the summit of Mt. Diablo, and since then a few specimens have been collected on Mt. Hamilton, Mt. St. Helena, and along the wagon-road near the

top of Mt. Tamalpais; and now, amongst other annuals, it is frequently found in the loose soil of the "burn," and grow to a much greater size than usual.

Another most interesting and somewhat rare plant which makes its appearance here is the Californian poppy (*Papaver Californicum*),* and it grows abundantly in two or three localities. It was discovered only a few years ago upon the Santa Inez mountains, near Santa Barbara, and I have since seen it growing in quantity there on mountain slopes recently burned over and on the soft earth along trails. It has been rarely collected since its discovery, and why this year it should appear in this region in several different places is difficult to explain. One locality in which it has been found, is along the new trails on the side of Mt. Tamalpais, near Mill Valley, a dozen miles from the "burn" on Bolinas Ridge, where it is most abundant.

Nearly as much interest is attached to the presence of *Calandrinia Breweri*, a rare plant of the southern portion of the State. Upon Bolinas Ridge and on the sides of the new trails of Tamalpais, this year, apparently for the first time, magnificent plants appeared spreading over the ground and forming mats three feet in diameter.

Silene multinervia is a plant especially abundant on Santa Cruz Island, and has also been found in several localities of the southern parts of the State and as far north as Monterey. It was described as a new species by Dr. Watson a few years ago, and it is not yet a common plant although it must be spreading throughout the State. This year it appears in great abundance upon the Bolinas "burn" of the seaward slope of Mt. Tamalpais.

The simultaneous unexpected appearance of these three recently discovered southern plants under such circumstances gives rise to many interesting questions. Mt. Tamalpais, only a few miles distant from San Francisco, is a region that has been frequently visited by botanical collectors during many years, and is as well known botanically as any other part of California, and yet no one has before this recorded the presence of these plants, so it seems prob-

*Since these notes have been in type an interesting article by C. R. Orcutt, recording similar instances of the appearance of this and other plants in burned over districts of Southern California, has appeared in *Garden and Forest*.

able that their first appearance has been made at a recent date. These plants produce numerous small black seeds that are not furnished with appendages of any sort, and cannot be carried by the wind or attached to the coats ofanimals and thus distributed far and wide. Of course these plants spring from seed, but was the seed deposited upon the soil recently, or had it remained there many years and sprouted when the conditions were favorable? If the seeds were dormant in the soil at the time of the fire, which burned to the ground all dead leaves and branches, they must have been covered by earth so as to have had their vitality preserved from the heat. It seems most probable that they were brought in after the fire, but in what manner, it is difficult to say.

These three plants, the poppy, the Calandrinia and Silene, in the southern part of California, are especially fond of recently burned or cleared localities. A burned region of the Santa Inez mountains soon produces innumerable specimens of *Papaver Californicum*, and the hillsides of Santa Cruz Island, from which the Manzanita and Ceanothus have been cut, are immediately covered by large specimens of *Silene multinervia.*

Another unexpected plant is *Krynitzkia micromeres*, which abounds in this burn, as it has been found to do in similar situations in Lake County and near Ione in Amador County.

The young Ceanothus, the hosts of Gilias, Krynitzkias, Phacelias, Hosackias, etc., common in the region, may have come from seed dormant in the soil, fallen into cracks, or may have been introduced in various ways from the surrounding neighborhood.

The remarkable luxuriance of the vegetation succeeding fires may be due in part to the admixture of wood ashes it receives, but the loosening of the soil probably has much more to do with it. Every botanical collector in California has observed a similar luxuriance in the growth of certain species of plants on recent enbankments or in deserted fields that had at some time been plowed.

NOTE.—Dr. Sereno Watson writes me that *Astragalus coccineus*, published in the May number of this journal, is probably the same as his *A. grandiflorus*, the description of which I had in some manner overlooked. In this he is probably correct, although one is described as having "7 to 9 leaflets," and "peduncles shorter than the leaves"; the other, "12–15 leaflets," and "peduncles considerably surpassing the leaves." Vegetative characteristics are, however, of minor importance.

T. S. B.

NESTING HABITS OF THICK-BILLED SPARROWS.

BY HARRY R. TAYLOR.

At Blue Cañon, in the Sierra Nevada Mountains, early in June, 1891, I found the thick-billed sparrow *(Passerella iliaca unalaschcensis)* quite common. They were especially numerous on a low, brushy slope grown with young fir and pine trees, just above the railroad station.

The weather in the mountains had been very variable, marked at this place by late rains, which seemed to me to account for a striking diversity in the time of nesting of many pairs of different species—numerous nests containing far advanced young, while others of the same kind were in process of building.

The thick-bills were found to be very tame, some of them occasionally alighting on the veranda of the hotel. They were constant in song during the nesting season, and their pleasing notes seemed to be the most characteristic ones of that mountain region. I have listened to them singing cheerily at dusk, during a shower of rain. On June 12 I saw a young bird trying to fly, and two days later I discovered a nest containing three young; it was about two and a half feet above ground in a low pine tree, compactly built of shreds of bark and lined with dry grass stems. Another nest found June 18 also contained three young. It was built on a horizontal limb in a low growth of willows, somewhat over two feet from the ground, and was compactly constructed of dry twigs, with small shreds of bark, the innermost layer being of fine grass stems. The parent bird flew excitedly about near me, and then trailed in the grass to entice me from her nest.

The thick-billed sparrow has a habit of frequenting some favorite spot, as the top of a bush or a telegraph wire, where it sings its cheerful song untiringly, doubtless near where its mate broods patiently on the nest.

On the 1st of July I found three fresh eggs in a nest built near the ground on a mass of thorny vines beneath a clump of fir trees. I took another nest of this species with two eggs, which was all that would have been laid as I waited several days for the full complement. This particular bird must have had its own peculiar notions of the hygienic necessities of a household, for it built its nest among some low weeds and vines in a pretty spot right over the edge of a rippling stream.

NOTES ON INTRODUCED PLANTS OF SANTA CLARA.

BY B. FRANK LEEDS.

Rumex acetosella is a lively plant at Santa Cruz, both in irrigated lawns and in fields that are quite beyond the reach of water in summer. Single plants of it seen by me in 1883 on the narrow-gauge railroad, a third or half a mile from the town station, were as much as 30 inches across and half as high, exhibiting hundreds of branches and thousands of leaves, all of which came from one central stem and root, and not from a number of radiating underground stems. Such plants I never met with elsewhere, and supposed them to show the results of two or three years' continuous growth, free from disturbance by track-cleaning employees, the passing boy and the tramp, who seem, for some unguessable reason, to have avoided them. Here in Santa Clara I have knowledge of but one specimen of this species, and that is—or was until my last attempt to destroy it—between planks of the broad-gauge station platform. For two or three years I have kept it from maturing seed, but the inaccessible root doubtless still remains alive.

At San Jose I saw this Rumex once in lawn grass, and several days since noticed it near the station at Los Gatos—only one plant, which should have been lifted and destroyed, but the thought to do so did not come to me until too late.

Franseria tenuifolia is, according to the Brewer, Watson and Gray Bot. of Cal., a native of the southeastern corner of the State, extending thence beyond the State line southwardly and eastwardly.

This species has, somehow, reached Santa Clara. About three years ago I observed it covering thirty or more lengthwise feet of surface along the fence of a cultivated lot and a parallel line of it in the adjoining street gutter, where it had evidently been for some time.

Bits of root were transferred to my yard, where they have thriven finely, and still continue, but need frequent pruning, both above and below ground, to keep within bounds. This is another spreader by underground stems. Its usual hight is, perhaps, not over three or four feet, but in the frequently moistened soil about my house its panicle-terminated, rough and grayish stem has reached quite eight feet.

Eighteen months ago the same species appeared at the Santa

Clara broad-gauge station, amongst cinders, by the side of tracks passing in front of the freight house. Seed in quantity I at once suspected, and still believe, had been swept from two roofless and sideless freight cars, or had fallen from lumber or other goods taken therefrom upon this coarse and fine locomotive furnace refuse, as the plants were growing along the rails for just the length that two such cars would measure, and nowhere else. I advised the extermination of this visitor to save a neighboring seed farm from invasion, but, though several attempts have been made to do so, that desirable end has not yet been accomplished.

Another species approaching the above in shape of leaf and general aspect, though reaching a height of not over 30 or 36 inches, and apparently *F. Hookeriana*, has also come into this valley. This is an annual plant, gray-leaved and rough-stemmed like *F. tenuifolia*, and a bearer of fruit furnished with flat, thin and broad spines.

It seems to belong principally along the eastern border and southern section of the State. Hereabout, I know of it at but one point, which is three miles east on the Berryessa road and opposite brick-making and cattle-yards. The latter enclosures I especially mention, as they seem to furnish an answer as to how this station for the species was established, though it is possible that birds, rather than the soiled hairy coats of horned stock, were the conveyors of the seed. The two seaside growers of this genus, though never wandering away from the petty hillocks of the beach or the higher dunes immediately at their rear, succeed as well on the uplands, in irrigated soil, as in their own respective homes. Sheep and woolly dogs must frequently pass over these plants, and, catching the spiny fruit in their clothing, carry it miles back to heavier soil and higher ground. Why should not such naturally sown seed occasionally germinate, and, in favorable situations by perennial streams, for instance, or in continuously moist meadowy ground, thrive and spread into noticeable plantations?

One of these species, the very variable *F. bipinnatifida*, grew for two years at least, in the yard of a house I occupied at Santa Cruz; and here at Santa Clara the other species, *F. Chamissonis*, has for three years spread itself attractively over a border's edge, and, scattering its fruit, has become the center, each spring, of a gay and gray group of its kind.

During the same visit to the oceanward border of the Golden

Gate Park that yielded me the seeds of *F. Chamissonis*, I procured fruit also of the Huron tansy *(Tanacetum Huronense)*, and that, too, I find is quite as well pleased with the soil and treatment I have given it at Santa Clara as it could have been with the sands, winds and fogs of its native seaside. It is a rapid grower, beneath the ground as well as above it, has large, handsome, silvery leaves, always looks trim because never exposing its faded foliage to sight, and is. altogether, as bright as anything I can think of in civilized gardens Why should it not have a place within garden fence or park paling, where, in either case, the area is large and trees and shrubbery are features?

Single specimens of purple salsify, *Tragopogon porrifolius*, are to be seen at a number of points along roadsides, in this vicinity evidencing recent establishment. Its occurrence, however, is rare enough compared with its near but very dissimilar and unattractive relative, the ox-tongue helminth, *Picris echioides*, of Central and Southern Europe, England and Ireland. It would be interesting to know when this latter came and how far it already extends. It is a conspicuous object on the main roads from Alviso to Santa Clara and San Jose, and spreads laterally some distance from these toward the east and west sides of the valley. Two other composites of this same tribe, very prevalent here and well established perhaps all over the State, *Sonchus asper* and *S. oleraceus*, though not greatly better looking, are liked by horses and rabbits and, doubtless, cattle and sheep, but not a single good word that I know of can be said for the thoroughly rough, coarse and crabbed newcomer, the helminth. Blue-flowered chicory *(Cichorium intybus)* last year appeared upon the footways of the Alameda, which is the broad drive connecting Santa Clara and San Jose, and this summer I find a group of it just beyond the northwest corner of Santa Clara, on the San Francisco road. This plant is likely, before very long, to give the roadways of the State what they now so conspicuously lack—a touch of cool, clear blue to lessen, to the driver's fancy at least, the soaring temperature so frequently experienced during our summer, and a something to contrast with the continuous marginal bands of yellow, the dead and faded grasses and the ash-gray road itself.

My garden borders have *Euphorbia peplus* and *Veronica Buxbaumii* as occupants. The former came to them, by intention, from

Fox's Nursery to which it had certainly been introduced with seed or plants from the Eastern States or Europe. For the latter my borders are indebted to a dooryard at Watsonville, in which town this speedwell is quite a fixture. I have also seen it at Santa Cruz. *E. peplus* is not uncommon at Rochester, N. Y., where it is to be seen occasionally on the inner edge of footways, oftener in yards and still more frequently in the nurseries and seed-growing grounds of several well-known firms. Of course, it is from these last that it has ventured beyond upon streets and private grounds. It is not, however, a wanderer, for its seed is too heavy to travel far except by aid possibly of our feathered friends, or our own wet or muddy shoes.

Though it is all over my yard I have never seen it upon the abutting streets, nor is it in Rochester anywhere away from the garden fence sides, so that I am disposed to think the birds have little if any liking for it. The plant is a bright little thing and matures its fruit so quickly that it is sure to leave one crop behind though the wet season that prompted its quittance of the seed state be but a short one. Bauxbaum's speedwell is quite as smart as the spurge at lengthening its stems, which are prostrate, at flowering and at seed sowing and is like it too, in its stay at home habit.

Both these plants are doubtless in California to stay. The seed of thyme-leaved spurge, *Euphorbia serpyllifolia*, came to my yard in loam, with many other plants, from the river-side. This is so neat a thing, asks so few favors, and covers the earth at edges of beds so attractively that I have encouraged it to stay though I will say but few hints in that direction were necessary.

Another speedwell, sent me from Massachusetts *(V. officinale)*, does well on the north side of my house where it gets a part of the afternoon's sun. The one plant I possess is two years old and covers two feet by three of surface, has recently flowered and at this writing, after three or four days of unusually warm weather, is apparently in as good a condition as anything within my palings. *V. Americana* is visible in spring in a roadside ditch two miles away, where later appear *Boisduvallia densiflora*, *Eryngium petiolatum* and *Mimuluses cardinalis* and *luteus*.

A half mile beyond, upon this same road—the Kifer—there is a station of the Philadelphia fleabane, *(Erigeron Philadelphicus)*, and upon the Homestead road, and again as we near Saratoga village,

there are groups in season of *Erodium botrys*, the former group, as it is the smaller of the two, presumably the more recently established. Between Saratoga village and the Springs Hotel *Sidalcea diploscypha* and *Ranunculus muricatus* are at home. The latter, if one may indulge in a guess with its very rough and hook-terminated achenia in view, is likely to plant stations rapidly, and may in a few years be as numerously represented in our less fertile fields as some of the native species are in those surfaced with richer soil.

Within a fortnight I have discovered the presence near by of a tall grass with 9 to 12 inch long panicles the divisions of which are pale green and closely appressed.

This is *Beckmannia erucæformis*, which is credited to the northern part of the State, and a vast region beyond.

NOTICES OF CERTAIN CALIFORNIAN BIRDS.

BY WALTER E. BRYANT.

The black swift *(Cypseloides niger)* has been noted by but few observers in California. Most of the information has been obtained by Mr. Belding, but usually from the interior of the State; he, however, saw a flock of about twenty near San Diego on May 21, 1881, and Mr. Emerson saw thirteen of these birds at Haywards on April 19, 1885. Dr. Cooper saw a bird which he supposed to be this species at Santa Barbara in May, 1863. In the first week of July, 1889, I saw several black swifts flying above the bluff, along the coast, ten miles southward from Monterey, and this year Mr. F. H. Holmes secured several specimens in the same locality and reports having seen them near Santa Clara, in both of which localities he believes they were breeding. No nests have actually been found in this State, but the eggs have been taken near the coast northward (Seattle).

Notes upon the occurrence of the blue-winged teal *(Anas discors)* in California are given by Mr. Belding in the present volume. Another specimen (male) was taken near Napa this year and presented to the California Academy of Sciences.

THE FERNS OF TAMALPAIS.

BY MARY ELIZABETH PARSONS.

Marin County, California, has been said to consist of "Mount Tamalpais and its skirts." Although less than three thousand feet in height, constantly visited by naturalists, and within a few miles of a great city, Tamalpais is still very imperfectly explored. This is largely owing to its wild and rugged character and to the dense growth of chapparal which covers a large part of it, making exploration away from the roads and trails, slow and difficult. In its fastnesses, not only the wild deer, but bear still linger, though the latter are seldom seen.

It may be that future and fuller knowledge of the region will add one or two ferns to the following list, but they are all that have been noticed so far, and nearly all that are to be expected in Central California, near the coast. Our State is not rich in ferns.

1. POLYPODIUM VULGARE. "Common Polypody." This species needs but a passing mention, as it is so well and widely known.

2. POLYPODIUM FALCATUM, which is peculiar to this Coast, is given as a variety of *P. vulgare* in Synopsis Filicum. I have found it in cañons about Tamalpais Station. It differs in its somewhat larger size, and in having pinnæ tapering to a long and slender point. Both *vulgare* and *falcatum* are found in wooded spots, though the former often nestles in the crevices of exposed rocks, while the latter may be seen hanging in great masses over rocks bordering a shaded stream, having a very elegant appearance.

3. POLYPODIUM SCOULERI may be readily distinguished from our other species by its thick leathery fronds, broad blunt pinnæ and magnificent fruit. It is peculiar to the Western Coast. According to the Botany of California, it is found "on trees and stumps, more rarely on rocks or on the ground." These remarks must apply to more northern districts, for in this region it is found only on rocks exposed to the sea winds and fogs. I have found it at Point Reyes, near the light-house, and it grows in crevices of the rocks which crown the hills behind Sausalito.

4. ASPLENIUM FILIX-FŒMINA, "Lady-Fern," occurs in both broad and narrow forms. It is of a tender and beautiful green, and of

graceful form, and there seems an exquisite propriety in its common name, as one sees it fringing the cool streams, and mirroring itself in their brown depths.

5. WOODWARDIA RADICANS, popularly known as "Chain-Fern" from the interrupted chain-like appearance of its sori, is our largest fern, attaining a hight of seven or eight feet in this region. It requires a great deal of water, and usually sends up its great crown of leaves along the water-courses; or, if found upon a hillside, it is a certain indication of subterranean springs. It is one of our most valuable ferns for decorative purposes.

6. LOMARIA SPICANT, "Deer-Fern," also loves the water. It haunts springy, marshy spots, and may be easily known by its two kinds of fronds—the barren and the fertile—the pinnæ of the latter narrowly contracted and thickly covered with its dark-brown sporangia. It has been found in Wildwood Glen, near Sausalito, in a marshy spot high up on the hillside; in Tennessee Valley and in Bear Valley, near Olema. It is the only one of the species here enumerated which has not been reported from Tamalpais proper.

7. ASPIDIUM ACULEATUM, which is a very cosmopolitan species, grows here, in its normal form, though very sparsely. I have found it but once, in a wooded cañon on the north slope of Tamalpais.

Variety CALIFORNICUM, with its long narrow fronds, and pinnæ cut but slightly above the middle, is more plentiful, growing along shaded streams at very low elevations. The gradations from this form to the next species, *A. munitum*, are often very puzzling.

8. ASPIDIUM MUNITUM is a wonderfully variable fern, changing its form and size with every change of habitat. Perhaps its most typical form is that from which it takes its popular name, the "Sword Fern," long, slender and plume-like. It grows in our wooded cañons luxuriantly, its great plumes giving an almost tropical air to the scene.

9. ASPIDIUM RIGIDUM var. ARGUTUM is one of our most common species, growing everywhere in dry woods. It varies a good deal in size, but not so much in aspect, and its fronds have a strange fashion of bifurcating at times, which is rather interesting.

10. CYSTOPTERIS FRAGILIS, "Bladder-Fern," the most delicate and fragile of our species, is of filmy texture and small size,

a shy grower, and may be found sparsely in moist places in Lagunitas Cañon, the cañons at Larkspur, Mill Valley, etc.

11. ADIANTUM EMARGINATUM "Maiden Hair," our more common species, grows everywhere in shady woods and on the banks bordering old wood roads at small elevations, sending up its beautiful black polished stems and tender fronds abundantly in tufts from its fibrous, thread-like roots.

12. ADIANTUM PEDATUM, "Five-fingered Fern," seeks its home here at usually a greater altitude, and in very secluded nooks. This is the common species of Adiantum in the Atlantic and Western States, and it may be that it finds a more closely corresponding climate here at an elevation. Nothing could be more beautiful than a mossy bank covered with this fern, with the cool water trickling through the moss, as it may be seen in the higher mountain gulches on Tamalpais. It is found in many places: Wildwood Glen at Sausalito, the cañons facing oceanward on Bolinas Ridge, the Lagunitas branch cañons, Redwood Cañon; no doubt too, in Bear Valley.

13. CHEILANTHES CALIFORNICA has herbaceous fronds of a bright green, smooth and most delicately cut, and the usual dark-brown polished stalks. It has recently been found in the upper part of Redwood Cañon, growing in rather dry soil, on cliff-like rocks—shaded, however, and not far from the stream.

14. CHEILANTHES GRACILLIMA is found near both summits of Tamalpais, in crevices of the rocks. Its fronds are slender, and covered on the under surface with rusty, matted wool.

15. CHEILANTHES MYRIOPHYLLA grows at somewhat lower altitudes. The fronds are covered beneath with ovate scales. I found, in 1883, a small, dwarfed variety of *myriophylla* growing upon rocks on Mr. Liberty's ranch, and sent them to Professor Eaton, who wrote me that he had received similar specimens from Mount Diabolo, Yosemite, Bartlett Springs and Pacheco Pass. Several years after I found the large form growing with the small one in the same place.

The last two species are commonly called "Lace Ferns." They are of the same grayish color, and the ultimate segments of the fronds are minute and bead-like, but are readily distinguished by the covering of the under surface. They are found only about dry rocks—never near water.

16. PELLÆA DENSA, with its finely-divided segments, is found on rocks near Mr. Liberty's house, so near the road that they may be plucked in passing. It is found in similar dry, rocky localities on that side of Tamalpais, especially below the higher summit.

17. PELLÆA ANDROMEDÆFOLIA, with its reddish stems and small pinules, has been popularly, but erroneously, called "Red Maiden Hair." It usually seeks its home under the partial shade of some shrub or tree, which affords its brittle fronds protection as well. It is to be found at low elevations, while *P. densa* and *P. ornithopus* seek height; the former usually growing a thousand feet or more above sea level.

18. PELLÆA ORNITHOPUS, with its finely-divided, stiff, grayish and erect fronds, seeks the dryest and most barren rocky places, fully exposed to the sun. It is found at various places on the rocky ridge leading from Tamalpais to Bolinas Ridge, and is an extremely variable fern. One can find forms of widely differing widths according to habitat, but the very long and narrow forms have been placed in a separate species and called *P. brachyptera*, which, however, in its typical form, is not, to my knowledge, found in the county.

The Pellæas are all rock lovers, with coriaceous leaves, and are commonly called "Cliff" or "Rock Brakes."

19. PTERIS AQUILINA, known as "Brake," "Bracken," or "Eagle Fern," may be found everywhere—on open hillside, in field or meadow. It usually seeks good soil, and luxuriates in it. In some other counties it attains a great height, spreading in a manner most alarming to the farmer, who is unable to get rid of it in any way. This must be the black sheep of this charming order of plants, whose characteristics are to be described by only the most agreeable adjectives in most other cases.

20. GYMNOGRAMME TRIANGULARIS I have left to the last. This little plant is distinctively Pacific, and dear to the heart of every lover of ferns. Everyone knows the "golden-back," and knows where on shaded banks to seek it. Its beautiful little triangular fronds of glossy green, with their powdered under surfaces and elegantly polished black stipes, are familiar to most of us.

A second form of it is found in Yosemite and in the southern part

of the State. This form has silver-white powder, or farina, and the lobes of the frond are blunter, giving the fern a coarser aspect than the golden-back. The difference in appearance of the two forms seems to me quite as great as that in many another instance where it has formed the basis for elevating a new variety, at least.

NOTES ON THE CACTUS WREN.

BY A. W. ANTHONY.

I first made the acquaintance of the cactus wren (*Campylorhynchus brunneicapillus*), in southwestern New Mexico, where they were abundant in all suitable localities, their large covered nests forming quite a conspicuous feature of the landscape wherever cactus or other thorny growth offered suitable nesting advantages.

As these nests were usually seen in groups of from four or five to a dozen, frequently six or seven being seen in one mesquite bush, the first impression obtained was that the birds nested in colonies. As the season advanced, however, and the collections of nests were found to be used by but a single or at most two pairs of birds, a question of what the rest of the nests were for, frequently presented itself. It was very evident from even a casual examination that nearly or all of the nests had been built at about the same time, and from their uniform fresh and unbroken appearance I concluded that they could not have been subjected to the driving storms and wintry winds that sweep that country from October until April.

It was not until the winter of 1889, however, that a possible explanation presented itself. On October 24 of that year, while hunting antelope near the Mexican boundary, I availed myself of the protection of a small thicket of mesquite scrub to observe the movements of a herd of game in the plain beyond. I had scarcely concealed myself when I saw flying toward me a cactus wren, with its mouth full of dry grass. Alighting in a bush near by it immediately entered a nest within thirty feet of me, and after a moment reappeared without the grass and started for another load. An examination showed that the grass had been used as a lining and to further thicken the walls. The long horizontal tunnel-like opening also gave evidence of having been lengthened. Five or six other nests within a radius of fifty feet all showed equal evidence of having been refitted and strengthened. Here at last was a possible

clew to the many empty nests seen during the summer, and, hoping to gather further information, the locality was frequently visited until December 16. The work of rebuilding the old nests continued during pleasant weather until about the first of December. By this time all of the nests of the vicinity were so thoroughly repaired that they had every appearance of new nests. At no time was there more than one bird to be seen. I think, however, that a pair were interested in the improvements, as the notes of a second wren were heard at no great distance. During storms or cold windy weather I frequently found cactus wrens in the very near vicinity of these and other nests, and while I never succeeded in catching them in the nests I am confident that they were made use of at such times as shelters from the storm and probably also as roosting places. It would also appear that several of the nests were repaired and used during the winter by the same pair of wrens.

Upon coming to the Pacific Coast I was immediately impressed with the difference in the nesting habits of the species as seen in Southern and Lower California, and in the higher regions of New Mexico and Arizona. I am unfortunately without a series of measurements of the nests of the two regions, but am safe in saying the bird of the coast region builds a smaller nest, especially noticeable in its much shorter covered opening, which in fine specimens from the interior (New Mexico and Arizona) frequently measures from twelve to fourteen inches in length and is supported by being built along a horizontal branch of *cholla* cactus or thorny bush. California nests are seldom or never, as far as my experience goes, found in colonies. Two or more nests are sometimes seen in the same thicket of cactus, but in such case each nest is used by a pair of birds, there being no supplementary nests to be used as lodging-houses, as would appear to be the case in the interior, nor have I any evidence of the nests in mild coast region being rebuilt for use in winter.

EDIBLE MOLLUSKS OF WESTERN NORTH AMERICA.

BY HENRY HEMPHILL.

In the January number of the Nautilus, Professor Josiah Keep, of Mills College, published an article on the "Edible Mollusks of San Francisco Markets"; and in the July number of the same journal, Mr. R. E. C. Stearns, of the U. S. National Museum, adds

some notes on other West Coast "Edible Shells"—and as food supply is always a question of great importance to the people of every country, I have made out and offer the following list of West Coast mollusks that I have eaten, or know to have been eaten by others. Besides those listed there are, undoubtedly, many others on our coast that are edible. I believe a large majority may be used as food, but care should be taken in collecting and preparing them. All univalves (periwinkles, etc.) found adhering to rocks containing copper, and all mollusks adhering to the bottoms of vessels, should be rejected as articles of food, for they are more or less poisonous. It should be remembered that the bottoms of all vessels not sheathed with copper plate are coated every few months with copper paint.

In preparing mollusks for food the indigestible parts — such as the byssus of the mussels and the opercula or trap-doors of the periwinkle, and other univalves — should be removed or rejected. To all I would say, eat lightly of mollusks at all times, for some are supposed to contain a large amount of phosphorus, which may occasion nausea, or sometimes serious sickness.

OSTREA LURIDA Cpr. "California Oyster."—From Puget Sound to San Diego and southward. Abundant on the mud-flats, between tides, adhering to everything. It is small and of a moderately fair flavor. Those offered in the San Francisco markets are brought from Shoalwater Bay, Washington, where they grow larger, and perhaps are better flavored than elsewhere on our coast. Morgan & Co. was the first and principal firm to enter into the trade, and for several years employed a number of schooners in transporting them to market; but since the introduction of young Eastern oysters into the Bay of San Francisco the trade in our West Coast bivalve has greatly diminished.

PECTEN ÆQUISULCATUS Cpr. "Scallop."—From San Pedro to San Diego, and southward into Lower California; inhabiting mud-flats, between tides, where it is found in abundance. The scallop is well known and highly prized as a delicate morsel by many people along the Eastern Coast. Its fame has extended to San Diego, where it is offered in the markets and largely eaten.

MYTILUS EDULIS L. "Black Mussel."—From Puget Sound to San Diego. Usually found inside bays and where more or less fresh

water mixes with the salt. Generally attached to the piling along wharfs, where it exists in abundance. Highly prized along all sea coasts where it is found as an article of food. It is offered in San Francisco and Oakland markets.

MYTILUS CALIFORNICUS Conr. "Large Mussel."—This, which is the largest mussel known, is found all along the California coast, attached to points of rocks subjected to the full force of the surf. It is eaten by many persons, and said to be excellent boiled and pickled in salt and vinegar and served cold. It is found in great quantities in the Indian mounds.

CARDIUM ELATUM Sby. "Cockle."—San Diego and south to the Gulf of California, on mud-flats at low tide. The largest known cockle. Excellent for chowder, soup and pies.

CARDIUM CORBIS Martyn.—Puget Sound to San Francisco Bay. On mud-flats between tides. Occasionally offered in San Francisco and Oakland markets with other clams.

TAPES STAMINEA Conr. Small Hard-shell Clam.—Abundant at many places along the coast of California. The common clam of San Francisco market.

TAPES STAMINEA var. LACINIATA Cpr.—San Diego, on the mud-flats; rare. Excellent cooked in any manner.

TAPES TENERRIMA Cpr. "Hard-shell Clam."—Puget Sound to Lower California. Outside sandy beaches, below extreme low tide, and on mud-flats in Puget Sound. Of a rather strong flavor, and not as desirable for eating as the other members of the genus.

AMIANTIS CALLOSA Conr. "Large White Clam."—San Pedro to Lower California. Sand beaches at extreme low tide. Very nice cooked in any manner.

TIVELA CRASSATELLOIDES Conr.—From San Luis Obispo County to Lower California, and very abundant on sand beaches at extreme low tide. This is the common large edible clam of our southern coast. It is highly flavored, but tough when cooked, and good only to flavor soups and chowder. It is used largely at San Diego for fish bait.

CHIONE SUCCINCTA Val.—San Diego and south. Abundant on mud-flats near low tide.

CHIONE SIMILIMA Sby.—San Diego and south. Abundant on the mud-flats between tides.

CHIONE FLUCTIFRAGA Sby.—San Diego and south into Lower California. Abundant on sandy beaches between tides.

All three of these Chiones, commonly known as hard-shell clams, are occasionally offered in the market of San Diego, and are highly esteemed for their flavor and tenderness.

SAXIDOMUS NUTTALLI Conr. Intermediate between the hard and soft shells.

Puget Sound to Lower California. In gravel-beds, between tides, where it is found quite plentiful. Sold in the markets of Portland, Oregon, and the towns on Puget Sound. At San Diego it sometimes figures conspicuously at clam-bakes, and is highly esteemed by the clam-bakers.

SAXIDOMUS ARATUS Gld.—San Diego. Mud-flats, between tides. Very nice for chowders, soup and pies.

MACOMA NASUTA Conr.—From Puget Sound to Lower California. Inhabiting mud-flats, at low tide; not rare, but difficult to find. Excellent eating when made into any kind of clam fixings. Abounding in the shell mounds about San Francisco Bay.

MACOMA SECTA Conr.—From Bolinas Bay to Lower California; sandy mud-flats, between high and low tides; not rare, but, like the preceding, hard to find living. Excellent cooked in any manner. The shells of the Macomas being thin, they are often called soft-shell clams.

GARI RUBRORADIATA Nutt.—Monterey to San Diego. In gravel beds; rare. Very nice eating. Occasionally found with the following.

SEMELE DECISA Conr.—San Diego, south into Lower California. Gravel beds. It is said to be a very superior clam for cooking.

SCHIZOTHÆRUS NUTTALLI Conr.—Bolinas to Lower California. In gravel beds at low tide.

"Beats any clam yet discovered for chowder, soup and pies." "The mere memory of the soup and chowders I have eaten at various times, where Schizothærus was the grand staple, is like a

gleam of sunshine through a London fog.''— R. E. C. Stearns, in Nautilus for July.

This fully establishes the reputation of my friend Stearns as a man of great taste, as well as a poet. I can confirm all he says in regard to the edible qualities of this noble clam.

MYA ARENARIA L. "Soft-Shell Clam."— From Puget Sound to Santa Cruz, California. The spawn of this well-known shell-fish was introduced into San Francisco Bay with the young Eastern oysters, but, unlike the oysters, it took kindly to its new home, and now has full possession of almost every foot of the mud-flats along the bay. I was the first one to detect its presence in the bay, and young specimens were named *Mya Hemphilli* Newcomb.

MYA TRUNCATA L.—Puget Sound. Occasionally offered in the markets, with other clams, at Port Townsend, Washington.

PLATYODON CANCELLATUS Conr.—Bolinas to San Diego. Abundant between tides, burrowing in hard clay and soft sandstone rock. Said to be excellent eating.

PANOPÆA GENEROSA Gld.— Widely distributed, from Puget Sound to Lower California; three feet deep on the mud-flats at extreme low tide. If Schizothærus beats all other clams for chowder, soup and pies, this queen of all edible clams beats all others, not excepting the choicest Eastern oysters, for delicious flavor and fries. Some years ago, while collecting shell on Puget Sound, I found the boys at Olympia collecting this clam for the Portland restaurants, where it was justly esteemed for its delicious flavor and tenderness. From the Indians near by, whom I found drying and smoking clams for future use, I learned that they called them Geoducks, and valued them highly—probably more for the quantity of food they furnished than for their flavor or tenderness. I called the attention of the late Professor Baird, of the Smithsonian Institute and Fish Commission, to the edible quality of this mollusk, and he determined to introduce it on the Eastern Coast. Mr. Stearns was entrusted with collecting and carrying out the experiment, but I have not learned what success attended his efforts.

SILIQUA PATULA Dixon. "Razor Shell."— Astoria, Oregon, to Santa Cruz, Cal. Found on sandy beaches at low tide, and sold in the markets of Astoria and Portland, Oregon. Equal, in every

respect, to *Mya arenaria*, for any kind of clam pies, chowder or soup. Burrowing in sand at extremely low tide.

HALIOTIS RUFESCENS Swains.—Mendocino County to Lower California. Among rocks at extreme low tide.

HALIOTIS CORRUGATA Gray.—Santa Catalina Island to Lower California. Among rocks at extreme low tide. Somewhat rare.

HALIOTIS SPLENDENS Rve.—Santa Barbara Islands to Lower California. Among rocks at low tide.

HALIOTIS CRACHERODII Leach.—Monterey to Lower California. Among rocks between tides.

All four of these abalones are edible, and their fine flavor has long been known to the sailors, fishermen and ranchers along the coast of California, notwithstanding a recent writer in Forest and Stream asserts—on the authority of, perhaps, some San Francisco market huckster—that: "Americans do not understand the art of preparing them, while the Mexicans make of them a dish that is admirable."

My experience among American sailors and ranchers, while collecting shells along the coast of California, satisfies me that they are experts in preparing fresh abalone chowder and fries.

The Haliotis, or Abalone, as it is commonly called, is largely collected on the southern coast of California and along the coast of Lower California. The animal is dried and sent to China for food, while tons of the shells are yearly sent East and to Europe, where they are manufactured into ornamental and useful articles.

OCTOPUS PUNCTATUS Gabb.—Almost everywhere along the coast of California this mollusk is collected and dried for food by the Chinese. I am informed the Italian fishermen eat the arms, or tentacles. The flesh is white and delicate looking, but I am satisfied to allow the Chinese and Italians to eat all of them.

There is a report that one of the land shells, *Helix arrosa*, has been offered for sale in the San Francisco markets.

I have also been informed that *Ariolimax Columbianus* Gould, the large slug which is such a pest about San Francisco, has been eaten by various persons, after removing the slimy outer covering. The gardeners would probably be pleased if such a taste were more widely spread.

CHIA.

BY EDWARD PALMER.

The family of Labiates furnishes few food plants to mankind. Some few, like sage, thyme, sweet marjoram, etc., are used for flavoring, and several others as aromatic teas with more or less reputed medicinal virtues, but I believe among civilized people, only the Mexicans use them to any extent as regular articles of diet.

Chia, a name associated both with food and drink, occurs in the early histories of Mexico, but no clue is there given to the plants which furnish it. I have given some time in my botanical travels in Mexico to the investigation of the matter and find that several species of the genus Salvia are commonly used, both by Indians and Mexicans, in the preparation of various forms of food and drink.

That the use of Chia is of much antiquity is proved by finding large quantities of it with ancient Indian remains; the custom of burying food with the dead evidently prevailing as it does to-day. Among the aborigines it is known by names in their own tongue—the Pimo Indians call *Salvia Columbariæ* "Dak"—but in intercourse with Mexicans or Americans, only the Spanish "Chia" is heard.

As a food both nutritious and palatable it deserves to be better known. The white races are, perhaps, too apt to look with contempt upon the contents of the Indian granary, and though Chia is never likely to take rank as one of the great staples, it may come to be as universally esteemed among civilized as it is among the aborigines of the region where it grows.

In preparing Chia for use the seeds are roasted and ground, and the addition of water makes a mucilaginous mass several times the original bulk, sugar to the taste is added, and the result is the much prized semi-fluid "pinole" of Indians and others—to me one of the best relished and most nutritive foods while traveling over the deserts; the ground meal mixed with sugar being very portable and easy to prepare while journeying. The taste and appearance is somewhat that of flaxseed meal. One readily acquires a liking for it, and learns to eat it rather as a luxury than on account of its exceedingly nutritious properties.

Salvia Columbariæ, a very common plant both in California and Mexico, grows so abundantly in some localities that it can be cut,

threshed and cleaned like grain, finds purchasers in the markets and drug stores of Southern California, Southern Arizona, Sonora, Sinaloa, Lower California and the gulf side of Mexico. In these localities it is the basis of one of the most popular drinks used, not only by the Mexicans and Indians, but by many Americans.

Salvia carduacea, of more limited range than the preceding, extending from Central California to the northern part of the peninsula, is used in the same manner and under the same name.

Salvia Hispanica grows about Guadalajara, in the State of Jalisco, and in the neighborhood of the City of San Luis Potosi.

Salvia tiliæfolia grows about the settlement known as Norogachic, inhabited by the Tarahumares, in the Sierra Madre.

Salvia Chian, inhabiting the central table-lands of Mexico, has a wide distribution.

Each of these plants is prized by the inhabitants of their localities for the uses which can be made of them. *S. Columbariæ* and *S. Chian* are the best adapted to cultivation, large crops of these species being grown and harvested with profit, the seeds being a staple article and in constant demand.

One of the most refreshing drinks known is prepared by infusing the seed-like nutlets in water. The mucilagious drink resulting retains the aromatic properties, which are lost in the roasting, which is the preliminary step in preparing it for food; and when sweetened and flavored with lemon juice, is especially grateful in the hot days of summer, even to the sick, as it is easily borne by the most delicate stomach, and at the same time affords considerable nutrition.

Chia meal is often mixed with the meal of roasted corn, or other grains. If used without further cooking, it is called as above, "pinole." If cooked in water as gruel or porridge, it is "atole." It is a very agreeable food, particularly if sugar or flavoring is added. The Pima Indians are especially fond of Chia "atole," and consume large quantities of it.

The seeds of Salvia are useful in gastro-intestinal disorders, and it is often used in the manner of flax-seed as an emollient, or for cataplasms.

CHIA GRANDE is *Hyptis suaveolens*, a very common plant in the State of Colima. The seeds are gathered in large quantities from wild plants as well as from those cultivated as a crop by the Indians,

and they are used in the same manner as the seeds of Salvia, developing apparently even a greater quantity of mucilage when wetted. Among the Indians it is called "Chan," and to the attolle or gruel made by mixing it with corn they apply the name "Bate." Its aromatic properties are destroyed by cooking, but the mucilaginous property is largely developed. It makes a rather tasteless dish unless a little salt is added, or, as the Indians remedy the defect, a syrup made from sugar is sprinkled over it.

Both the drink and the attolle prepared from Chian grande, are sold in the markets, the Indian women keeping it in large gourds, covered over the top with banana leaves for cleanliness. In supplying customers a small gourd is used as a dipper, and water is added whenever the attolle becomes too thick.

Tea made from the roots of *Hyptis suaveoleus* is used to purify the blood, and it is also used as a remedy for the diseases of women.

THE "REED BIRDS" OF THE SAN FRANCISCO MARKETS.

BY WALTER E. BRYANT.

For an indefinite number of years there have been exposed for sale in the markets of San Francisco, particularly during the summer, small Californian birds, picked, and six of them ranged side by side with a skewer running through them. The entire bird, although picked and drawn, requires more than a passing glance to determine to what one of several species it belongs, for the "reed bird" of San Francisco, it is almost needless to say, is not the true reed bird or rice bird of the Atlantic Coast which is presumably the bobolink *(Dolichonyx oryzivorus)*, although occasionally other species may be substituted. I have made it a practice never to pass a stall where so-called "reed birds" are offered for sale without stopping and noting the species, or at least the genus to which they belonged, and have been surprised to find to what extent harmless if not positively beneficial birds are slaughtered that the scant morsel of flesh on either side of the keel of the breast-bone may be served as an *entrée* in the better class of San Francisco restaurants.

First it will be interesting to know what is a San Francisco "reed bird?" Generally speaking, it is a horned lark *(Otocoris)*, known to the market men and pot-hunters who furnish them, as "bean

birds," the flesh of which is rather light-colored, tender, and the birds often fat. They may be known from others by the long claw to the hind toe. Fifteen years or more ago this bird was almost the only species killed for this purpose, but the long-continued, persistent slaying of this species, together with the increase of settlement, making it necessery to journey farther after them, has resulted in the substitution of most any other species of about the same size in place of them, and as the birds are always dressed before being brought to the dealers, who cannot distinguish between *Otocoris*, *Zonotrichia* and others, they answer the contemptible purpose for which they were killed — a fashionable dish in a cosmopolitan restaurant, or on a foreign family's table.

It is directly due to foreign taste that this slaughter of small birds has existed and to the game and fish commission of California that it continues, for surely no one who has often visited the markets can have failed to notice one to ten dozen small birds upon the marble counters of game and poultry stalls.

Among the species which are destroyed by pot-hunters are horned larks *(Otocoris)*, several species of sparrows belonging to the genera *Zonotrichia* (two species), and more rarely *Melospiza* and *Ammodramus;* house finches *(Carpodacus)* are notable victims, and occasionally goldfinches *(Spinus)* belonging to two or three species have been seen in one lot with birds as large as blackbirds *(Agelaius* and *Scolecophagus)*, which represent the maximum size of a "reed bird," while goldfinches are as small as any that have yet been sold.

It is somewhat surprising that the detested house sparrows from Europe have not shared the same fate with native birds, but the so-called English sparrow is a wary bird (when his destruction is desired) and is confined more to the limits of cities and towns, and moreover his flesh is not considered as dainty and delicate as the others, while a knowledge of his feeding habits may prejudice some.

More rarely sandpipers *(Tringa minutilla* and *Ereunetes occidentalis)* are resorted to in order to supply the markets with "reed birds," but the dealers say that the "sandpeeps" are "too strong" and do not give satisfaction to their patrons.

The prices at which these birds sell are from twenty-five to fifty cents a "stick" in the markets, being at the rate of fifty cents to a dollar a dozen, although I have known them as low as thirty-five cents a dozen and they rarely exceed one dollar.

The demand for them is not very great, yet at this time of year the daily sales in San Francisco probably range from one or two dozen a day to ten dozen or more.

About two or three are served to one person, sometimes more, according to the supply and price and the standing of the restaurant. The annual destruction must amount to many thousands and has only the extenuation on its side of being carried on most extensively when the birds are not breeding but congregated in more or less mixed flocks in open fields, or along roadsides and patches of chaparral. The hunting is almost exclusively done by Frenchmen well advanced in years, and may be considered under two heads: First, the solitary individual, afoot, who keeps just without the jurisdiction of city police, and with a muzzle-loader of small or medium bore, fires murderous charges of fine shot with small loads of powder into the mixed flocks of linnets, canaries, etc., feeding in the grass and weeds, or rakes them from the top-rail of a fence or telegraph wire. If in a field he marks closely the spot, and depositing his hat or something else for a mark, circles about the fatal area, picking up the dead and wounded. Hints or threats from suburban citizens are always and promptly acted upon, and he will be seen no more for several days if at all in that locality. It is not his policy to question his right or privilege to shoot in any particular neighborhood, and in this respect he differs markedly from the average sportsman. The particular delight of this individual is to follow up flocks of horned larks, for they are usually many and command the best price. Secondly, there is the old Frenchman in a cart or light wagon drawn by a wreck of a horse. His method is to keep moving along country roads and do most of his killing from the fences and telegraph wires on either side of the road. He is invariably accompanied by a small boy, probably an apprentice, who does the retrieving. His policy also distinguishes him from the average sportsman, inasmuch as he will not fire when another team is near, not so much from a dislike to risk frightening the horse of another but rather to prevent attracting attention to his nefarious occupation.

Formerly the man on foot was accompanied by an ill-trained dog, but now he usually travels alone; probably the dog was found of little use in retrieving and a great deal of a nuisance when traveling on cars and ferry-boats.

The very light reports made by the guns used by these bird enemies, suggests that white powder may be in use by them; it certainly has the merit of little smoke and light report, two important considerations for semi-illegal gunners.

The principal collecting grounds are the suburbs of San Francisco, along the line of the railroad into San Mateo County, and in the vicinity of Berkeley, Alameda County. One party informed me that many of the birds were taken by netting.

The tendency of this phase of bird destruction is to steadily increase in severity, and it has long since arrived at that stage of importance which should bring it to the notice of the authorities interested in bird protection.

There has already been some talk upon the subject of introducing European song birds into California, and some day it may be desirable to do so, but the first step should be protection to those we now have, and this protection may be begun by legislating in favor of the persecuted "reed birds," and the extermination, if possible, of the English sparrow.

FIELD NOTES ON THE PLANTS OF BAJA CALIFORNIA.

BY T. S. BRANDEGEE.

LYROCARPA XANTI grows a much larger plant in the south, than at its northern limit about San Gregorio. This increase in size, going southward is common and was especially observable in such species as *Aplopappus spinulosus*, *Aster spinosus*, *Bebbia juncea*, etc. In other species, however, the reverse obtains, the species depauperating as they go southward, as in the case of *Atamisquea emarginata*, *Schœpfia Californica* and *Maytenus phyllanthoides*.

The apple tree as it grows about San José del Cabo affords a fine example of a different habitat upon a species. At first I failed to recognize a familiar friend, its habit being so very unlike that to which I was accustomed. It grew about ten feet in height, the small and slender branches erect and closely surrounding the stem, giving it somewhat the appearance of a compressed Lombardy poplar. I was told that the fruit was always worthless.

THYSANOCARPUS ERECTUS, Watson.—This name should replace in part *T. lacinatus*, Pl. Baja Cal. 128. This species was orig-

inally collected by Dr. Palmer on Guadaloupe Island, and he has since found it on Cerros Island.

FOUQUIERIA COLUMNARIS is certainly a queer looking tree. It is often hollow within and becomes a convenient hive for wild bees. The honey bee is slowly traveling southward in Lower California and is now more than half way down toward Cape St. Lucas.

SIDA XANTI opens its flowers in the afternoon and so also does *Abutilon Californicum* and some other Malvaceæ; they are very common in the Cape region and their numerous blossoms add much to the beauty of the afternoon flora, compensating for the Ipomæas closed by the hot sun.

PROSOPIS JULIFLORA "mesquit" affords much food for horses and cattle in the middle latitudes of the Peninsula. On our long overland journey in 1889 two mules that had acquired a bad habit of straying away even when "hobbled," were usually tied at night to a mesquit tree so that they could eat the leaves and tender twigs from the lower branches, or sometimes the boughs were cut for them; and although they lived at times entirely upon this, at the end of a long journey of two or three months, they appeared as fat and strong as the well behaved animals that were allowed more liberty and consequently had a greater choice of food. The mesquit trees are highly valued by the cattle men for the food they furnish their stock.

CÆSALPINIA PULCHERRIMA, "tabachin," is found only as a cultivated plant. It is very handsome and showy, especially when in bloom, its mass of color visible at a great distance. Its large leaves made up of many leaflets are graceful and its red and yellow flowers are magnificent; it grows tall enough to overtop the fences and hedges and is certainly an ornament to the gardens of San José del Cabo.

CRESCENTIA ALATA, a queer looking garden tree is planted for the gourd-like fruit which is credited with medicinal properties. This fruit is about four inches in diameter and when used, is filled with "mescal" through a hole made at one end, then persons imagining themselves affected with chest diseases drink out the liquor from time to time expecting to become cured.

Another cultivated tree about the Cape is the cocoanut palm. The palms are the tallest trees in San José and the leaves of the cocoanut palm growing out more nearly horizontal than those of

the Washingtonia furnish a prominent perch for some birds. The turkey buzzards of San José when not busy, either sit securely upon the roof of the church or unsteadily swing on the waving leaf of a cocoanut palm.

CYCLANTHERA TESTUDINEA. This species is peculiar to the summits of the mountains of the Cape Region. In its description the manner of disseminating the seeds was not fully described. While gathering specimens, I noticed that as soon as the plant was moved, the ripe fruit would burst and shoot the seeds into my face and about in all directions. Other species of the genus are said to have "explosive" fruits.

ARRACACIA BRANDEGEI was described from specimens collected upon Magdalena Island, where the main stem of the plant is very short. In some locations of the high mountains of the Cape Region, this stem or stalk is often four or five feet high and leaf-bearing only at the top or near it.

CASTELA TORTUOSA abounds, especially within a mile of the ocean, from Magdalena Bay along the shore to Cape St. Lucas and around to La Paz. At San José del Cabo, it began to bloom in August, but although the numerous bushes were continually and carefully examined only staminate flowers could be found during September and October. Finally early in November pistillate flowers were found at La Paz. The bright scarlet fruit is rather handsome and when ripe the whole bush somewhat resembles a thorny Lycium, but children easily distinguish them and avold the bitter tasting fruit of Castela and eat the berries of Lycium.

CYRTOCARPA PROCERA is described in Engler's Anacardiaceæ as a very large tree growing in the warm regions of Southern Mexico. The tree referred to this species in the Flora of the Cape Region is much smaller, but otherwise seems to be the same. Since the notes concerning it have been printed, flowering specimens have been received from the Cape Region and the flowers agree with those of *Cyrtocarpa*. Possibly comparison with specimens of *Cyrtocarpa* from Southern Mexico might prove it to be a distinct species. The ripe fruit is usually very pleasant to the taste, although on some trees it is always bitter; the difference in taste is caused by some individual peculiarity and such peculiarities are not uncommon amongst wild fruits of various genera. On a hot afternoon, far from water, it is always delightful to find the shade of one of these

trees and eat the juicy, ripe fruit with which the ground under them, in September, is in most cases plentifully sprinkled.

FRANSERIA is a genus composed mostly of low shrubs or herbaceous plants, sometimes prostrate, like those which help to stay the sands of our dunes, and to find a species becoming tree-like, was quite unexpected. Between Triumfo and La Paz, one of the species grows so tall, that it was with difficulty I could secure specimens from the lowest branches, although I was on horseback. The small trees are fifteen or more feet high with ascending branches, and probably belong to *F. flexuosa*. The same plant was seen north of Comondu growing four or five feet tall, in large clumps.

IPOMÆA is exceedingly well represented in the southern part of the Peninsula; there are red, scarlet, purple and white ones, but the large yellow flowers of *I. aurea* are the handsomest of all. Its woody stems climb over the bushes and hedges, blooming profusely, and the flowers remain open most of the day in the bright sunlight. *I. bracteata* bears small flowers, and the plant is more conspicuous when the large bracts become red, as they do on the Sierra de la Laguna, after their flowers have fallen. The well known cypress vine *(I. Quamoclit)* is common, and it is pleasing to see this common garden flower growing wild. For producing quantity of color, *Jacquemontia abutiloides* far excels any of its near relatives, the Ipomæas. It is usually low but sometimes spreads out over bushes a length of ten feet, and when in full bloom seems to bear more flowers than leaves; it is then a mass of blue.

MIRABILIS TRIFLORA is not a common plant and is one that could not be overlooked. I saw it in but two localities, once in a deep cañon on the Sierra de la Laguna and once on a steep bank by the side of a road near the mines of Triumfo. The plant repeatedly branches, has weak stems, and grows into a large, prostrate, entangled mass. It bears numberless bright scarlet flowers and becomes a blaze of color, and would be an ornament to any garden. A Mirabilis from the high mountains is also a handsome species but can not compare in beauty with *M. triflora*. This mountain "four-o'-clock" grows erect two or three feet high, has large leaves and nearly white blossoms that are two or three inches long with exserted stamens twice that length. It loves a rocky habitat.

TECOMA STANS grows in the Comondu region only in gardens where it has been planted, but in the Cape Region it is abundant in

all cañons along the base of the mountains and its large yellow flowers are very handsome and conspicuous.

BELOPERONE CALIFORNICA and *B. Hians* as well as *Justicia Palmeri* look very much alike in the field, and it requires some botanical skill to collect them intelligently. Their red blossoms are seen in most localities south of Magdalena Bay.

HIMANTOSTEMMA PRINGLEI is fond of the sandy soil near the ocean at the Cape, and grows in great abundance amongst the dwarfed bushes. At this place it is associated with some plants that are known from no other locality and some that, although they have an extensive distribution, were seen in the Cape Region only close to the ocean. *Euphorbia leucophylla*, the handsomest of the prostrate "golondrinas," grows in clean sand between the bushes and high tide line, and so does also the showy *Aplopappus arenarius*, Scævola, Martynia and others. Phaulothamnus is one of the dwarfed bushes, that in the south seems to grow only on wind swept shores.

JATROPHA CANESCENS is known by the name "lomboi." Sometimes the leaves are glabrous. It is one of the most common bushes of the southern region and large specimens reach a height of ten or twelve feet. The flowers are either ochroleucous or dull red in color. Its presence is soon missed when one begins to ascend the high mountains; it is then replaced by another species, *J. cordata*, of similar habit, but having sticky leaves, that glisten in the sunlight as if varnished.

FICUS PALMERI is found from San Ignacio to the Cape, especially among rocks and upon the face of cliffs. The trunk is very white, and on the perpendicular rocks flattens out at the base and assumes various fantastic forms, some of them even when the trees are small, becoming four feet wide while only two or three inches thick, and finally branching out in all directions seeking crevices for a foothold. In good soil, in the bottom of cañons or about springs, it is a fine, well-shaped, large tree and affords an agreeable shade from the hot sun. The small figs are edible, but I think no one eats many of them, and certainly would not eat any without a good appetite. The trunk never grows tall enough to be made into boats or canoes and all the "dug outs" so common about Magdalena Bay, San Jose and La Paz are fashioned from the fig trees of Mazatlan on the mainland. When the small figs are ripe the tree is full of animal life; numerous insects are buzzing around, attracted by the sweet exuda-

tions of the fruit, and humming-birds are continually flying through the branches. Sometimes in cañons this fig bears numerous aerial rootlets, but generally the trunk is smooth and light-colored. Along trails and thoroughfares the trunks are marked with crosses, intitials, etc., following a custom too common for the beauty of our madroños, alders, etc., in Alta California.

EUPHORBIA MAGDALENÆ is not the only species which has its involucres distorted into galls, though they appear to have been seldom noticed. They occur in nearly the same form in plants from Todos Santos, referred by C. F. Millspaugh to *E. versicolor*, and in two other species from the Cape; in these latter, however, the galls are oblong or ovoid and sometimes of considerable size.

ZEPHYRANTHES ARENICOLA is common on the mainland opposite Santa Margarita Island, and grows much larger than the cultivated specimen from which the description was drawn. A yellow flowered species also grows with it, and both render the barren sandy soil they inhabit more attractive.

BEHRIA TENUIFLORA is a liliaceous plant resembling very much in general appearance the "fire cracker" *(Brevoortia coccinea)* of our northern coast counties. Its scarlet flowers can be found from Todos Santos and San José to the top of the mountains, and are well worthy of introduction into our gardens.

PHŒNIX DACTYLIFERA, the date palm, is planted in damp alkaline soil and does well. Whether it grows better in such situations or is planted there because the soil will grow no other useful plant, I do not know, but it certainly thrives and bears quantities of fruit.

WASHINGTONIA SONORÆ is a common palm about San José and other settlements. The large leaves are used for roofing the houses of the poorer classes and then afford a lodging place for snakes, lizards and mice. On the eastern slopes of the high mountains both *Washingtonia* and *Erythea* are abundant along the streams, growing to be forty or fifty feet in height. On the western slope, I saw very few, but at Todos Santos and other places *Washingtonia* is cultivated.

The Cape Region, although the number of its ferns is small, produces more than would be expected. *Cheilanthes Pringlei* comes down nearer to the Cape than any of them, and can be found on shaded banks within two miles of San José del Cabo. The presence of *Gymnogramme trifoliata* about the gardens of Todos

Santos and its absence from those of San José and other places, creates a suspicion that it may be an introduced species. The *Notholœnæ* are of course handsome ferns, but the most graceful of all is *Adiantum concinnum*, which grows with its long fronds pendent from rocks and overhanging the streams of the Sierra de la Laguna.

The inhabitants of the Cape Region are dependent on the vegetation in many ways and the native plants are put to all possible uses. Very many of them are credited with medicinal properties and every disease is treated by some plant which is supposed to at least alleviate the sufferings of the person affected. Bark of the different "copal" trees tan the hides; small sticks cut from bushes are tied together with rawhide into crates for holding "pinoche" and even complete dwellings are constructed wholly from native bushes. Various wild fruits, such as *Solanum nigrum*, Malphigia, Vallesia, etc., not as desirable as those of *Cactaceæ* and *Cyrtocarpa* (ciruela) are often eaten. The intimate association of the vegetation with their existence has brought a certain knowledge of the plants to the people, greater than is usually found in more civilized communities. Nearly all the plants have local names, sometimes of Indian origin, often undoubtedly very old and many times evidently applied at a more recent date. The old women are the best authorities in native nomenclature, probably on account of their habit of collecting and preparing the medicines for family use. In common with many people holding much higher rank they do not like to admit ignorance and whenever a plant is shown to them are sure to name it something, and although nearly all the plants really do possess distinct names, some of these names include several species and genera. Such a one is "yerba del venado" (deer brush), which is applied to *Porophyllum* and is sometimes used in the same sense that "grease wood" is in Alta California,—that is for a mixture of small bushes of many sorts. Pega-pega is usually applied to the different members of the Loasa family but may mean any plant whose leaves and twigs stick to the clothing in the same way. *Plumieria* is known as "Cacaloxochitl," a corruption of an old Aztec word and the same term is applied to this showy bush or tree in Central America. Many names of Lower Californian plants are given to species and genera very different from those having the same name on the mainland of Mexico.

All species of the prostrate Euphorbias are known as "golondrina" and are all supposed to be specifics for snake bites.

The shape of the leaves suggests undoubtedly the names of many plants; for instance some small abutilons with heart-shaped leaves are called "corazon de Jesus" and a leguminous plant having similar shaped leaves is "corazon de Maria" (heart of Mary); "uña de gato" (cat's claw) belongs to several species of different genera of Leguminosæ and "uña de gavilan" (hawk's claw) is a name for *Panicum crus-galli.* Some have received names in honor of the saints, as "palo de San Juan" (St. John's tree); "flor de San Miguel" (St. Michael's flower); "palo verde" (green tree) is the name of a tree with green bark (Parkinsonia); "palo amarillo" (yellow tree) is the name of the yellow-wooded Esenbeckia. Some trees and plants are known by names that seem to be wholly inappropriate; why *Cassia occidentalis* is called "palo de zorillo" (skunk tree) when it possesses nothing to suggest such a name, I have never been able to discover and the origin of the name "palo de Adam" (the tree of Adam), a name for *Fouquieria*, seems equally vague unless its habit of clothing itself with leaves after every rainfall may suggest it.

THE TIGER BEETLES OF CALIFORNIA.

BY GEORGE W. DUNN.

The ocean beach is a favorite place for a collector of coleopterous insects; the shallow pools sheltered from the high winds, the sloping banks left moist from the receding tide, the numerous sand dunes piled up by constant winds along the shore, are always rich in animal life.

Among the many forms found, especially in such localities, there are none more conspicuous than the species belonging to the genus Cicindela, popularly called the tiger beetle, perhaps because they bear, with their large heads, prominent eyes, scissor-like jaws, their light bodies of elegant form and brilliant color, their quick movements and ferocious habits, the same relation to other insects, that the tiger does to other mammals. They may be seen on any bright sunny day, running rapidly along on the damp or sandy ground, seeking small insects, which they readily capture and devour; in damp, or cloudy weather, they will be sought in vain. They fly a

short distance upon the least sign of danger, always alighting with their heads toward any approaching object. They are rather difficult of capture, and a net is necessary in collecting them. Experience has taught me that it is much easier to get them, if the collector goes down upon his knees. They seem to have less fear of him in that position.

As soon as they find themselves in the net they seize hold of it with their sharp mandibles, and cling with such force that these organs are often broken in loosening them. Before I learned better I several times lost valuable insects by dropping a tiger beetle into the bottle occupied by them. The fumes of cyanide act more slowly than their ferocious jaws.

The larva of the tiger beetle is a curious object. It is a white grub with a grotesque protuberance on its back, a large shining head with long black jaws, and occupies nearly perpendicular holes in the ground, of no great depth, and entirely free from waste dirt, such as is found about the dwelling places of ants and worms. Within its hole it waits, with head just even with the surface, till there comes within reach some unsuspecting insect, which it quickly seizes and drops to the bottom to devour.

The following species are found in California, though probably few are peculiar to the State. The time of appearance is approximately indicated, but is, of course, affected by early or late seasons:

1. CICINDELA LONGILABRIS var. PERVIRIDIS Schaupp.—Northern California. June—September.

2. CICINDELA PURPUREA var. GRAMINEA Schaupp.—Siskiyou County, in grass. June—September.

3. CICINDELA PURPUREA var. DECEM-NOTATA Say.—Northern part of California, along dry roads. June—September.

4. CICINDELA LATESIGNATA Lec.—San Diego on the seabeach feeding on small crustacea. The whole year.

5. CICINDELA LATESIGNATA var. With, and confluent with the type.

6. CICINDELA FULGIDA Say.—On banks of rivers amongst the grass. June—September.

7. CICINDELA SENILIS Horn. — About San Diego in damp places away from the seashore. May—September.

8. CICINDELA VULGARIS Say. — San Luis Rey about fresh

water, and almost everywhere in the United States. Nearly all the year.

9. CICINDELA VULGARIS var. VIBEX Horn.—San Bernardino, in damp soil and on the plain. May—September.

10. CICINDELA VULGARIS var. OBLIQUATA.—San Luis Rey with the type. All the year.

11. CICINDELA HIRTICOLLIS Say.—Sand dunes about San Francisco, and in damp places. Widely distributed. May—October.

12. CICINDELA CINCTIPENNIS Lec.—Interior of the northern part of the State. June—September.

13. CICINDELA CINCTIPENNIS var. IMPERFECTA Lec.—Northern part of the State and particularly abundant at the Dalles, Oregon. June.

14. CICINDELA SIGMOIDEA Lec.—Sea-beach at San Diego. May.

15. CICINDELA GABBII Horn.—Wilmington and San Diego, on the mud of the salt marshes. August—September.

16. CICINDELA HÆMORRHAGICA Lec.—San Diego and San Bernardino along freshwater streams. May. Alameda Salt Marsh. August.

17. CICINDELA HÆMORRHAGICA var. PACIFICA Schaupp.—San Bernardino with the type.

18. CICINDELA REPANDA var. GUTTIFERA Lec.—San Bernardino and Julian—at the latter place not appearing before October.

19. CICINDELA REPANDA var. OREGONA Lec.—About Lake Merced and at Alameda. May—October.

20. CICINDELA REPANDA var. DUODECIM-GUTTATA Dej.—Generally distributed. Sand dunes at San Diego, and found at the Market Street cut, San Francisco. May—October.

21. CICINDELA SOMMERI* Mann.—San Diego. June.

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*On a recent trip to Hermosillo, Mexico, I found at that place in wet sand along small streams *Cicindela flavoguttata* and the beautiful *Cicindela Sommeri* in abundance. At Benson, Arizona, I found *Cicindela tenuisignata* Lec. *C. lemniscata* and *C. flavoguttata* on damp banks along the San Pedro River, where I had not before found them. The river had recently overflowed its banks, and seemed to have washed everything away, and I found no water beetles where I expected them in abundance, but only Cicindelas, which probably had been brought by the high water from some distance up the river.

THE FLORA OF YO SEMITE.

BY KATHERINE BRANDEGEE.

Several members of the California Botanical Club have this year made large and important collections in and about Yo Semite, and these collections having been submitted to me form, with copious notes from Mr. J. M. Hutchings, the well-known pioneer of the valley, the basis of the following notes upon some of the more important plants of the region. The collection made by Mrs. Willie C. Dodd was much the larger. Those of Miss Ernestine Arnold and Mr. Hutchings while of less extent contained many interesting plants.* Neither of them is strictly confined to the valley proper but includes the surrounding heights, and the region extending from Wawona on the south to Cloud's Rest on the north.

TREES AND SHRUBS.

The trees and shrubs of the region are quite diverse as might be expected from the great differences in altitude, the floor of the valley being only about 4,000 feet, while its precipitous walls are 7,000 to 8,000, and Cloud's Rest, only a short distance above the valley, is 11,000 feet.

The California lilacs while not so abundant as in the coast mountains are fairly well represented. *Ceanothus integerrimus*, with its feathery, usually white, but sometimes blue plumes, grows at the lower elevations as does the closely related *C. parvifolius; C. decumbens*, slender and trailing with small heads of pale blue flowers, and *C. prostratus* covering its "squaw mats" with a profusion of purple flowers, are found at higher altitudes, as is also the "snow bush" *(C. cordulatus)*, which is white-flowered, glaucous, "low, flat-topped, and much spreading." Of this bush, which on the high slopes grows two to four feet high often in extensive semi-thorny thickets, not dense enough to walk upon and both too dense and too low to get through, the exploring botanist is likely to have lively recollections. It forms one of the most exasperating kinds of "chapparal" known to Californians.

C. cuneatus, one of the common chapparals of the western part of

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*I have not been able for lack of time to examine the collection of Miss Emily Edmunds.

of the State, bearing a profusion of white, overpoweringly fragrant flowers early in spring, grows along the north side of Indian Valley near the trail to Indian Cañon. This is about the limit of altitude to which the species attains in the central Sierra Nevada.

Rhamnus Californica, which has been reduced for what seems to be good and sufficient reasons to *R. Purshiana*, is abundant in the valley and usually known as "coffee berry"—much more commonly so than as "cascara sagrada." The other species found in the region, *R. crocea*, has very heavy close-grained wood; the bright red berries are said in the Botany of California to tinge the veins of the Indians red—the Indians of the valley are now so few and so much addicted to a more civilized diet that it is to be feared visitors will be unable to verify the statement.

The large-leaved maple *(Acer macrophyllum)* which belongs to the coast as well as to the middle elevations of the Sierra Nevada, is found in the valley and on the talus two thousand feet above its floor.

The bush maple *(Acer glabrum)* grows on the slopes of the Yo Semite walls in various places, especially near the trail to the Nevada Fall. Its beauty is much enhanced by a bright red fungus-like growth *(Erineum rubescens* Hark.) which often nearly covers the upper surface of the leaves.

The "poison oak" *(Rhus diversiloba)* is not found in the valley. It cannot be expected above four thousand feet and is rare above three thousand. Mr. Hutchings reports that there was formerly a single clump peering into the valley from below, but he exterminated it root and branch.

Chamæbatia foliolosa grows so abundantly on the way to the valley as to attract attention. Though usually much lower it sometimes attains a height of two feet, and away from the road is often, with its strawberry-like blossoms and broad minutely dissected leaves, a very beautiful plant. Its resinous exudation is, however, not very agreeable to the smell and is apt to retain all the dust which comes in contact with it. The nut-like fruit is said to have an agreeable flavor, but it is scarcely as large as a pea. Various not very flattering names have been applied to it by dwellers in the mountains. It is often called "tarweed," and in Amador county I have heard it called "mountain misery." Along the line of the railroad in Placer county it is often called "bear clover," perhaps

in accordance with our felicitous custom of giving names, because it bears not the least resemblance to clover, and the bear will have nothing to do with it.

The mountain ash *(Pyrus sambucifolia)* is not very common but may be found up the Tenieya creek. Its bunches of berries are larger and brighter in color than those of our "Christmas berry" *(Heteromeles arbutifolia)* so commonly used to brighten the evergreens in decorating rooms at the winter holidays.

The wild plum *(Prunus subcordata)* grows about the valley in small and scraggy form. It is much infested by a well-known fungus which blasts the fair promise of its flowers by turning its fruit into "plum pockets."

The "choke cherry" *(Prunus demissa)* is usually found about the banks of the streams, its stems and branches distorted and unsightly from the ravages of the "black knot," which in California seems to be confined to this species as it has not yet been reported from either of the remaining wild species, nor from cultivated ones.

Prunus emarginata, the bitter cherry of the higher elevations, seems to be entirely free from pests. Its small red fruit is intensely bitter.

The "mountain mahogany" *(Cercocarpus parvifolius)* grows on all the roads and trails about, but not in the valley. When in fruit its feathery whitish "tails" make a handsome appearance against the background of foliage.

The only rose of the valley is our familiar *Rosa Californica.*

The large-flowered raspberry *(Rubus Nutkanus)* is abundant about wet places in the cañons.

Spiræa Douglasii is abundant about the foot of the lower Yo Semite fall.

The western spice-bush *(Calycanthus occidentalis)* abounds on the way to the Cascades just below the valley.

Of the wild currants two species belong to the region, *Ribes sanguineum* to lower elevations and *Ribes viscosissimum* to the higher and particularly abundant between Grizzly Peak and Sentinel Dome.

The silk-tassel tree *(Garrya Fremontii)* is found occasionally at low elevations. The roots left in the ground become marbled with green and are used in inlaying woodwork.

The flowering dogwood *(Cornus Nuttallii)* with involucres of

shining white five inches in diameter followed by dense heads of scarlet fruit is a conspicuous object in the lower mountain cañons, and the less conspicuous *C. pubescens* abounds along Yo Semite Creek and below.

The twin-berry *(Lonicera involucrata)* and the dwarf twin-berry *(L. conjugialis)* are both to be found near the upper spring on the new trail to Cloud's Rest—the latter also at Glacier Point on the way to Sentinel Dome.

The snowberry *(Symphoricarpus racemosus)* and the two species of mountain elder *Sambucus glauca* (of which the cooked fruit is delicious) at lower, and *S. melanocarpa* with peculiarly stinking foliage, at higher elevations, are frequently seen.

The heath family furnishes a considerable part of the scrubby contingent of the valley and much of its beauty. Some of them, as *Kalmia glauca* about Cloud's Rest and *Cassiope Mertensiana*, are very small shrubs indeed, only a few inches in height, and *Vaccinium occidentale* in wet meadows above Indian Cañon bears its abundance of blue agreeably acid berries at no great height.

The mountain heath *(Bryanthus Breweri)* lifts its rosy blooms about the meadows of Cloud's Rest. It is well worthy of cultivation but our species of the heath family are many of them notoriously impatient of culture.

The western azalea *(Rhododendron occidentale)* is abundant and as fragrant though not so tall as in the ravines of the coast range.

Ledum glandulosum grows in the higher meadows above the valley. It is dreaded by the sheep men who say that it poisons their flocks. If such is the case it might be well for the Park Commissioners to spread it more generally about the meadows as one means of keeping the lawless and rapacious crew in bounds.

Yerba santa *(Eriodictyon glutinosum)* is found below the valley and at Indian Cañon and other places within it. It hardly reaches a higher altitude than the floor of the valley.

Nama Lobbii is found at various places on the higher points.

Dutchman's-pipe *(Aristolochia Californica)* grows near Tissaack bridge. The flowers are seldom collected because they appear before the leaves and are nearly the color of and half hidden by the stems of the bushes around which the vine twines itself. The large pendent fruit are, however, sufficiently conspicuous objects and so are the black, marked with red, caterpillars of *Papilio Philenor* which in

California feed only on this plant—though I have somewhere gathered an unverified idea that they have been induced, perhaps starved into, eating Thalictrum.

The laurel or bay-tree *(Umbellularia Californica)* abounds in the cañons usually in the form of bushes, though one tree of considerable size may be seen near the foot of the lower Yo Semite Fall. It, however, never reaches in the Sierra Nevada such dimensions as we find in the Coast Range.

Myrica Hartwegi, a rather rare wax-myrtle, though not found in the valley grows on the Merced below it.

The green alder *(Alnus viridis)* is extremely common as a shrub, about the borders of wet meadows both in the valley and on the heights.

The hazel *(Corylus rostrata)* and the chinquapin *(Castanopsis chrysophylla)* abound as they do on our Tamalpais.

The oaks of Yo Semite number three or four species. The deciduous one is *Quercus Kelloggii*—a black oak; the evergreen is *Q. chrysolepis*, both abundant in the valley about its margin and on the lower declivities. The variety *vaccinifolia* of the latter species reaches eight or nine thousand feet, gradually losing as it ascends the golden pubescence of the lower surface of its leaves. At the higher altitudes it is from two to five feet high and looks very unlike the type. Two other scrub oaks, *Q. Breweri* and *Q. dumosa*, are reported from the region but specimens are wanting.

Of the poplars, *Populus trichocarpa*, known locally as "Balm of Gilead," is common in the valley; a second species *P. tremuloides*, "quaking aspen," grows on the heights. The seeds sometimes come down with floods and establish themselves in the valley, but they finally die out.

The willows of the region are not very well known. They are mostly past flowering when botanists reach the valley and require special care in collecting as the male and female flowers (appearing before the leaves) are on different trees.

The conifers of the valley are those common to corresponding elevations nearly everywhere in the central Sierra Nevada.

Sequoia gigantea makes its nearest approach to the valley in the Tuolumne Grove seventeen miles away.

The white cedar *Libocedrus decurrens* abounds on the floor of the valley.

Of the three firs *Abies concolor* grows on the steep walls and at their summits. *A. nobilis*, although not frequent occurs in some places, as near the foot of Yo Semite fall. *A. magnifica* is found along the whole line of the south side of the valley and in great abundance near Glacier Point.

The Douglas spruce *(Pseudotsuga Douglasii)* is very abundant and the most valuable timber of the valley for bridging and similar purposes, being tough and strong.

The graceful *Tsuga Pattoniana* hardly comes lower than eight thousand five hundred feet. It is found on benches and mountain sides at Cathedral Peak.

The yew *(Taxus brevifolia)* grows near the water in the cañon of the Merced.

The "nutmeg-tree" *(Torreya Californica)* grows also in the cañon of the Merced but farther from the water. Neither this tree nor the last quite reaches the valley.

Juniperus occidentalis grows more and more stunted and shortened from the high summits of the walls nearly to the limit of vegetation. There are two trees on the Cap of Liberty which are ten feet in diameter.

The sugar pine *(Pinus Lambertiana)* and the yellow pine *(P. ponderosa)* are abundant in the valley.

Pinus monticola grows nearly everywhere on the heights—Sentinel Dome, Cloud's Rest, etc.

Pinus Jeffreyi grows about the summits of the walls, and so also does the "tamarack" *(Pinus contorta)* which is most usually found near water-courses or the borders of wet meadows. The common name of *P. contorta* is like too many others very misleading, as the tree is very different from the Eastern one called by the same name.

ANNUALS AND HERBACEOUS PERENNIALS.

Of these there are of course a very much greater number than of the trees and shrubs, so that anything like a complete list cannot be given in the limits of the present paper.

Ranunculus hystriculus Gray. This white-flowered Ranunculus is seldom collected but it has been brought from the crevices of wet rocks about Mirror Lake and in similar places at Vernal Fall and Yo Semite Fall.

The "marsh marigold" *(Caltha biflora)* is abundant in the marshy meadows on the trail to the summit of Cloud's Rest.

The columbine *(Aquilegia truncata)* is nearly as common as in our coast region, the flowers rather larger. The meadow rue *(Thalictrum polycarpum)* is the same as the one found about San Francisco, but the monk's hood *(Aconitum Columbianum)* does not in our latitude approach the coast.

The yellow water-lily *(Nuphar polysepalum)* is found in Hutchings Meadow, Eagle Meadow, etc.

Dicentra formosa, DC., which is also found in the immediate vicinity of San Francisco, makes a much better showing than with us. *D. uniflora* Kell. the second species of Yo Semite is peculiar to mountainous regions.

Among the cruciferæ *Arabis repanda* with its rather broad falcate pods; *Streptanthus tortuosus* Kell. with rounded clasping leaves and purplish flowers; *Cheiranthus asper* Ch. & Sch. with its showy head of deep yellow or orange, sweet-scented flowers, and the delicate "lace-pod" *Thysanocarpus curvipes* are found in all collections.

The violets are *Viola blanda*, *V. canina* var. *oxyceras*, *V. nuttallii*, *V. glabella* and *V. lobata*.

Of the Caryophyllaceæ *Silene antirrhina*, *S. Californica*, *S. Bridgesii* and *S. Douglasii; Stellaria nitens*, *S. longipes*, and *S. Jamesii; Arenaria congesta*, and *A. pungens* are all that are contained in the collections.

The widely distributed *Claytonia perfoliata* is usually found in smaller forms with the cauline leaves not so completely united as in the coast form. *C. exigua* forms low and dense glaucous tufts with linear leaves, *C. Chamissonis* and *C. parvifolia* occur in wet places, often clinging to the crevices of dripping rocks about the falls. *C. triphylla* is found usually at considerable altitudes above the valley.

Spraguea umbellata known as "pussy paws" is abundant on the floor of the valley towards the lower end. Its flowers, which vary from nearly white to deep pink, are showy and handsome, and as it loves the sand, its deep biennial root might be a somewhat useful, and its flowers most surely a welcome addition to the flora of our dunes.

Linum micranthum and the rare *L. digynum* are the species of our native flaxes found near Yo Semite.

Geranium incisum is found in all collections.

The Lupines of the region are not many but among them is found the handsomest of all the species, which was named *Lupinus Stiveri*,

a misprint for *Stiversii*, by Dr. Kellogg in honor of Dr. Stivers of this city. It is an annual with yellow standard and rose-colored wings.

Hosackia crassifolia grows to a very large size about the borders of meadows—especially so near Mr. Hutchings' cabin, and *H. Torreyi* with its yellow and white flowers is not uncommon.

Astragalus is notably absent from the region, but its space is well supplied by species of Lathyrus and Vicia.

Ivesia santalinoides grows on Sentinel Dome and other high points about the valley.

Potentilla gracilis is common about the valley meadows.

Potentilla tridenta is found in dry places about the walls and summits.

Bolandra Californica, a small saxifragaceous plant named in honor of Henry N. Bolander, abounds in some localities at middle elevations, notably about the Nevada Fall.

Heuchera rubescens is found in similar localities, as also the delicate *Mitella Breweri*, and several small species of saxifrage.

The "umbrella plant," *Saxifraga peltata*, is found in the borders of Cascade Creek and other streams flowing into the Merced.

Among the fleshy rock-plants *Sedum spathulifolium*, *S. obtusatum* and the purple *S. Rhodiola* are the most prominent. The last is found about Clouds Rest.

The evening primrose (*Œnothera biennis*) is frequent in the meadows about the valley.

Godetia purpurea, a near relative, grows all about the valley in dry places.

Clarkia rhomboidea is often met with about the valley and the diffuse and slender *Gayophytum ramosissimum* is common on the declivities.

The very showy willow-herb (*Epilobium angustifolium*), also known as "fire-weed" on account of its predilection for burns, grows near the borders of streams.

Zauschneria Californica, sometimes called the "California fuchsia," makes spots of brilliant red at the foot of the upper Yo Semite Fall.

Eucharidium concinnum, the most beautiful onagraceous plant in California, displays its deeply lobed, rose-colored flowers on the way to the Cascades.

The enchanter's nightshade (*Circæa Pacifica*), with its inconspicu-

ous flowers and small bur-like capsules, occurs in deeply shaded places at the upper end of the valley.

Among the conspicuous umbelliferous plants of the region are *Angelica Breweri*, *Peucedanum utriculatum* and *Selinum capitellatum*, the latter with its ball-like secondary umbels, near the river borders. The Umbelliferæ of the region are seldom collected in a sufficiently mature state.

Valeriana capitata may be found at various places, notably above Glacier Point, on the heights above the valley.

The Compositæ form, as everywhere with us, a considerable proportion of the flowering plants. The silvery Antennarias, *A. argentea* and *A. luzuloides*, spread their tufts over rocky and barren spots on the declivities. *Eriophyllum confertiflorum*, common on our coast, has in the valley a variety—*trifidum*—which brightens many a gravelly slope with a blaze of gold. *E. nubigenum*, first described from plants collected on the slope of Clouds Rest, was brought this year by Mrs. Dodd from the Little Yo Semite. *Arnica mollis*, with its rather large, rayless and nodding heads, is common in niches about the cliffs.

The purple-flowered *Lessingia leptoclada* is abundant at the lower end of the valley. The showy *Madia elegans*, either with or without a brown eye, brightens the early morning with its showy flowers. *M. Yosemitana*, which bears a considerable resemblance to the much more abundant *Hemizonia Durandi*, may be found some distance above the Nevada Fall on the way to Clouds Rest. *Chænactis Douglasii*, with its dissected leaves and brush-like head of flesh-colored flowers, is particularly abundant towards the lower end of the valley. *Hulsea heterochroma*, tall and branching, with large heads of yellow and purple, grows a short distance up the valley walls at Indian Cañon and several other places.

One of the species of "sneeze-weed," *Helenium Bigelovii*, grows in wet places about the valley. Various forms of *Senecio aureus* are found about the heights. *S. lugens* grows on the declivities and *S. triangularis* in wet places, both in the valley and on the heights. *Phalacroseris Bolanderi*, described from this region, grows in wet meadows near Sentinel Dome; *Troximon Nuttallii* and *Microceris nutans* are found at moderate elevations about the valley, and *Hieracium Breweri*, with its long-hairy leaves and yellow flowers, inhabits little clefts in the valley walls.

The asters, erigerons and golden rods scarcely occur in the various collections, on account of the early dates at which they were made.

Of the non-shrubby Ericaceæ, the white *Pleuricospora fimbriolata* is found at Wawona; "pine-drops" *(Pterospora andromedea)* and the snow-plant *(Sarcodes sanguinea)* at many localities on the heights. That this latter plant is not parasitic in the manner of the Aphyllons, which are attached to slender rootlets of the host, or of Boschniakia, springing directly from tuber-like swellings on roots of Manzanita, any one may satisfy himself by careful digging. The plant ends in a coralloid mass, very much as do the Corallorhizas, and though a recent ingenious attempt has been made to explain their growth by means of a contributory mycelium, we fear the author would be puzzled to find the "fungoid odor" of which he speaks on a fresh-dug specimen. The snow-plant is quite as handsome an object when its flowers are dead and dried as in June and July, the season of bloom. In an old and vigorous plant there may be found in autumn, well below the surface, surmounting the coralloid mass of roots, from one to six cones 2–3 inches in diameter and of the same bright color as the plant appears above ground. These condensed spikes are the shoots of the next year, and within them fully formed their flowers may seen, on making section. The plant, which is evidently a perennial of long life, bears besides these large buds of the ensuing year any number of smaller ones decreasing in size until barely visible.

The shooting-star *(Dodecatheon Meadia)* grows in its most robust form (var. *Jaffrayi)* in Hutchings Meadow. Specimens from this locality have scapes two feet long and leaves often fully eighteen inches. The capsule opens not through the base of the style, but by incomplete circumscission, the style usually remaining attached to one of the teeth.

The Sierra primrose *(Primula suffrutescens)* grows near Echo Lake and in certain localities near the South Dome. Its shining tufted leaves and heads of beautiful flowers inspire the wish to transplant it to a less inaccessible home, but as it grows often with the dwarf but large-flowered *Epilobium obcordatum*, in the very margins of perpetual snow, its acclimatization is a matter of serious doubt. The flowers are usually pink or rose-colored, but Mr. C. F. Sonne, of Truckee, has collected a form with pure white flowers.

Indian hemp *(Apocynum cannabinum)* is found in the valley, but

is not nearly so abundant as its dwarf congener *A. androsæmifolium* of the valley borders and walls.

Of the milkweeds, *Asclepias speciosa* and *Gomphocarpus cordifolius* are abundant, especially the latter.

The most beautiful of our species of Canchalagua, *Erythræa venusta*, has been brought from the lower end of the valley.

Two blue gentians, *Gentiana Newberryi* and *G. calycosa*, are found in high meadows—the latter especially, near the Anderson trail to the South Dome.

The spreading Polemonium *(P. humile)* grows about the heights on shady and moist hillsides, the more showy *P. cæruleum* is less frequent.

Phlox Douglasii abounds in tufts of white, lavender and various shades of pink, on nearly all the heights, particularly about Sentinel Dome.

Gilia abounds in and about the valley, as nearly everywhere in California. The yellow-flowered *G. grandiflora* grows at the lower end of the valley. *G. tenella*, *G. ciliata* and *G. heterophylla*, are common. The diffuse and slender *G. capillaris* grows near the upper end of Indian Cañon and *G. aggregata* and *G. pungens*, the latter of as many hues as *Phlox Douglasii*, are found on the heights.

Draperia systyla grows at moderate elevations on the walls of the lower end of the valley; yerba santa *(Eriodictyon glutinosum)* at lower elevations, and *Nama Lobbii* on the heights. The low *Hesperochiron Californicus* grows above Glacier Point. *Phacelia namatoides* grows near the summit at the lower end of the valley. *P. hydrophylloides* about the heights and *Nemophila parviflora* is common in the valley.

Mertensia Sibrica grows on the heights and *Echinospermum diffusum* and *Plagiobothrys Torreyi*, which stains a bright blue, are frequent.

The paint-brush *(Castilleia linariæfolia)* grows in red-tipped clumps about the heights; *Collinsia Torreyi* is found on the higher slopes at the foot of the valley, and the pale *C. tinctoria* frequents shady banks.

Mimulus luteus is found about the borders of springs and small streams; *M. primuloides* sends its slender scape-like stems from the borders of the damp meadows; *M. Fremonti* and *M. Torreyi* grow on rocky slopes near the foot of the valley; *M. Lewisii*, from the

grass borders, reflects its pink blossoms in the cold clear rivulets of the heights, and the yellow-flowered *M. mephiticus* on the gravelly side of Clouds Rest requites the pressure of a rude foot with an odor as unwelcome as unexpected.

The low "lousewort," *Pedicularis semibarbata*, is found on the heights on the north side of the valley. *Pentstemon breviflorus*, which is almost woody, grows near the foot of the valley, its pale flowers are often overlooked; *P. Bridgesii*, with rather long and scattered scarlet flowers, grows in shaded places near streams at rather high altitudes; the purple-flowered form of *P. confertus* dots the low meadows; *P. azureus* and *P. lætus*, with showy blue or violet flowers, are found on dry knolls and along rocky ridges; the low tufted *Menziesii* var. *Newberryi*, with red or purplish flowers, the mouth of the showy corolla almost closed by the woolly anthers, is found along the trail between the Vernal and Nevada falls.

The labiates are represented along the water-courses by the "mountain mint" *(Pycnanthemum Californicum)*, and the rosy-flowered *Lophanthus urticifolius*, and in drier places about the walls by the fragrant "pennyroyal" *(Monardella odoratissima)*, and by the "skullcap" *(Scutellaria Californica)*.

The "wild ginger" *(Asarum Hartwegi)*, hides its dull purplish flowers beneath large mottled leaves in moist and shaded places.

The orchids of the valley are not very abundant, two species of Corallorhiza are frequently found. *Epipactis gigantea* is common in cold spring marshes, and the showy and fragrant *Habenaria leucostachys* lifts its white spike two to four feet in the lower wet meadows. The mountain lady's-slipper *(Cypripedium montanum)* is occasionally collected, and *Spiranthes Romanzoffiana* and the rattlesnake plantain are not uncommon—neither, by the way, is the rattlesnake himself.

The Liliaceæ here, as elsewhere in California, furnish some of the most attractive flowers. *Brodiæa multiflora*, the yellow-flowered *B. ixioides* and the "soaproot" *(Chlorogalum pomeridianum)*, which opens its white starry flowers late in the afternoon, are frequent about the valley. The purple dog-tooth violet *(Erythronium purpurascens)* is found on the south side of the valley, from the upper iron bridge to Tooloolaweack Cañon. The small orange lily, *Lilium parvum*, is common about the meadows and streams, but the fragrant white *L. Washingtonianum* must be sought on

the roads leading out of the valley or on the heights above. The small-flowered Fritillaria *(F. parviflora)* is not uncommon, and *Tofieldia glutinosa* is occasionally found in the high wet meadows. Calochortus has four species, the small white *C. nudus* of the heights; *C. Maweanus*, usually pale lilac and very hairy within, not often collected; *C. Nuttallii*, the common yellowish species of the valley proper, and various forms of *C. venustus*, from yellow to purple, which approach closely if they do not enter the valley. The last two species are called "Mariposa lilies." Mariposa means butterfly and the abundance of these flowers gave their name to the county.

A list of the ferns and fern allies of Yo Semite, prepared by Mr. and Mrs. Lemmon, is given in Mr. Hutchings' "Heart of the Sierras." It is, however, probably rather a list of what might be expected than a record of plants actually observed. The limits would have to be somewhat elastic to include all of them.

THE NESTING TIME OF BIRDS ABOUT SAN FRANCISCO BAY.

BY CHAS. A. KEELER.

The present paper is based principally upon the data derived from the collection of eggs made by Mr. Walter E. Bryant between the years 1876 and 1882, mostly in the vicinity of Oakland, Cal., together with what material my own collecting during the past few years in the vicinity of Berkeley has furnished.

Strangely enough the hummingbirds are among the first to breed, and often begin nest building before even the hawks and owls. The rufous hummingbird *(Trochilus rufus)* arrives about Oakland and Berkeley somewhere near the middle of February, generally contemporaneous with the blossoming of the wild currant *(Ribes sanguineum)*, which bush it frequents for at least a month, or as long as the profusion of blossoms lasts, after which the task of nest building is undertaken. The earliest set of eggs is recorded by Mr. Bryant, March 16, 1881. The rainfall during that month was exceptionally light, only .88 inches having fallen, while the average for the month was 3.409 inches. We find also that the temperature was higher than the average during the spring of 1881, and these favorable circumstances may have hastened the

nesting time. The species apparently does not commence to breed regularly until early in April, from which time on until the latter part of the month fresh eggs may be looked for. I am uncertain whether or not the bird lays a second set, as data on this point is lacking, but fresh eggs of the closely allied Allen's hummingbird *(Trochilus alleni)* are recorded as late as May 25, 1880, from which it seems not improbable that both species may raise a second brood. This record, however, may be an exceptional one, accounted for by the phenomenally heavy rainfall in the spring of that year, 8.46 inches having fallen, against an average of 2.478, while the average temperature was much lower than usual.

Anna's hummingbird *(Trochilus anna)*, which is a resident species, is another early breeder, having been recorded nesting even in January* and Feburary. Our earliest records from this vicinity, however, are about the middle of March. From this time on fresh eggs may be found until the early part of June, a second brood being raised during that or the preceding month. The latest date on which fresh eggs have been found is June 7, 1888, but Mr. Bryant records a set containing large embryos on June 10, 1881.

Another tiny breeder of March is the California bush-tit *(Psaltriparus minimus californicus)*, which begins the construction of its elaborate pendulous nest early in the month. The earliest set of eggs recorded was taken March 16, 1881, which month, as previously noted, was especially favorable for early records. From the twentieth of the month, however, to early in April, the breeding season of this species is at its height, from which time it rapidly declines and by the middle of the month nearly all have young. In the latter part of May a second brood is sometimes raised, the latest date being May 28, 1880, but in this case as in the one noted above, the weather very probably retarded the period of nidification.

The plain titmouse *(Parus inornatus)*, like the preceding, a resident species, also commences nidification in March, the earliest date being March 27, 1879. The data in hand shows no evidence of a second brood being raised, the latest date on which fresh eggs were taken being April 19, 1879.

*Mr. A. M. Ingersoll found a nest at Oakland, January 14, with eggs about to hatch.

We come next to the larger birds of prey. Incubation apparently commences with tolerable regularity among them during the latter half of March. By far the commonest of these birds is the western red-tailed hawk *(Buteo borealis calurus)* which nests either in rain-washed holes or scoops in the faces of rocky cliffs or in the tops of live oak, or occasionally in a pine. The earliest record of fresh eggs is March 18, 1876, from which time on they may be found until nearly the middle of the following month. A second set may sometimes be laid in May. About the same time that the red-tail begins to breed the western great-horned owl *(Bubo virginianus subarcticus)* commences nidification. Mr. Bryant has found their eggs among the rocks in the retired cañons back of Berkeley in years past, and they still breed in this region, though probably in diminished numbers. Only one brood is raised; the latest date on which eggs are recorded being April 10, 1880. The breeding range of the prairie falcon *(Falco mexicanus)* is now very much more restricted than it was in 1877, when Mr. Bryant collected its eggs near Berkeley. At present it apparently breeds in no locality about here except in the rocks of Mt. Diablo, where we observed the birds feeding their young as late as the last of July this year. As the first eggs are laid as early as March 22, they apparently have two broods a year. There are but two other raptorial birds which breed about here in March, the turkey buzzard *(Cathartes aura)* and the American barn owl *(Strix pratincola)*. Both species nest during the latter part of this month and the beginning of the succeeding one, while neither, so far as the data at hand shows, raise but one brood a year.

We have now noted the species breeding in March in the region in question and traced their periods of nesting through the remainder of the season. Let us now take a brief survey of the field at the opening of April. Besides the species above mentioned, all of which are by this time well under way with their domestic duties, two new birds have now begun to breed, the California shrike *(Lanius ludovicianus gambeli)* and the California jay *(Aphelocoma californica)*. With the exception of one set of four eggs taken by Mr. Bryant on March 26, 1881, we have no record of the breeding of the latter species before April, while the shrike seldom lays its first egg much before the beginning of this month. A little later the smaller raptorial birds commence breeding—first the western

screech owl *(Megascops asio bendirei)* and shortly after the burrowing owl *(Speotyto cunicularia hypogæa)* and sparrow hawk *(Falco sparverius)*.

The eighth or tenth of the month has now been reached and the green-backed goldfinch *(Spinus psaltria)* and Samuels's song sparrow *(Melospiza fasciata samuelis)* have begun nest building, or even, if the season be favorable, laid an egg or two. During the first half of April no other species are added, so that we have at this time breeding, all the hawks and owls (the smaller ones just commencing, the larger, for the most part, well along), the bush-tit and plain titmouse, the three species of hummingbirds, California jay, shrike, song sparrow and goldfinch. The two last named, however, are hardly fully under way as yet.

By the middle of the month, or shortly after this time, our list is extended by several new species. Brewer's blackbird, which has been holding meetings in the top of some convenient cypress tree, and bowing and bobbing and scraping before the object of his admiration, has settled down to house-keeping. The California brown towhee *(Pipilo fuscus crissalis)* and bicolored blackbird *(Agelaius gubernator)*, follow soon after. The towhee breeds all through the month of May, but the sets recorded during the latter part of this month and early in June are probably the second brood of the season. Parkmann's wren *(Troglodytes aedon parkmanii)* and the red-shafted flicker *(Colaptes cafer)* come next on the list, followed closely by Gambel's sparrow *(Zonotrichia gambeli)*. Thus far we have not gone beyond the twentieth of April, but already the summer migrants have begun nesting. The western lark finch *(Chondestes grammacus strigatus)*, which arrives from the south about the fifteenth or twentieth of March, will have laid its full complement of eggs a month later. The house finch *(Carpodacus mexicanus frontalis)*, too, which has been carrying on an animated courtship for some time past begins to breed at about the same time. It is strange, too, that a bird which generally passes the winter with us in greater or less numbers, should not nest earlier, but they evidently plan to finish the family cares just when the fruit ripens, so that the young can be initiated into the mysteries of robbing orchards.

By the twenty-fifth of the month the warbling vireo *(Vireo gilvus)* which arrived about the last of March, and the western chipping

sparrow *(Spizella socialis arizonæ)*, which probably came during the first week of April, have begun nest building, but it is not until the next month that we are to look for the climax of their breeding period. Bullock's oriole *(Icterus bullocki)* western flycatcher, *(Empidonax difficilis)*, black pewee *(Sayornis nigricans)*, and California partridge *(Callipepla californica)*, are the only remaining species that commence to breed at the close of April.

During the month of May the height of the breeding season is reached. The month begins with a miscellaneous assortment of early and late breeders. The list includes, besides those species just mentioned as commencing to nest during the latter half of April, such species as the western screech owl, Anna's hummer, California jay, California bush-tit, sparrow hawk and burrowing owl. In early May the western meadow lark *(Sturnella magna neglecta)* is breeding, although I suspect that it is the second set, now first discovered in cutting the grain. The lazuli bunting *(Passerina amæna)*, which arrives from the first to the middle of April, has often laid its complement of eggs by the first of May. The western wood pewee *(Contopus richardsonii)* is not very common as a summer resident, but Mr. Bryant records a set containing large embryos taken on May 6, 1881, indicating that the bird probably begins to breed during the latter part of April.

Another uncommon breeder of early May is Lawrence's goldfinch *(Spinus lawrencei)*, the earliest record of its breeding having been made by Mr. Bryant, who took a set of eggs May 8, 1877. About this same time the swallows *(Petrochelidon lunifrons* and *Chelidon erythrogaster)* begin to breed; fresh eggs being first found about the fifth or sixth of the month, and from that time on until the middle of June. These later records doubtless belong to the second brood, although I am not certain that either species invariably raises two broods a year in this locality. The summer warbler *(Dendroica æstiva)*, russet-backed thrush *(Turdus ustulatus)* and black-headed grosbeak *(Habia melanocephala)*, three of the typical summer breeders (in distinction from spring breeders) of this locality, also lay their earlier sets during the first half of May. During the same period an occasional set of American goldfinch's eggs is recorded, the earliest date being May 11, 1877.

Although the earliest record of the nesting of Bryant's sparrow *(Ammodramus sandwichensis bryanti)* is May 12, 1878, it is highly

probable that this is the second brood, as the species is in song in the latter part of February and early in March.

The list of loiterers who do not begin to breed until during the latter half of May is small, including the mourning dove *(Zenaidura macroura)*, the western kingbird *(Tyrannus verticalis)*, Oregon towhee *(Pipilo maculatus oregonus)*, and probably the ash-throated flycatcher *(Myiarchus cinerascens)*, although the earliest set of eggs taken was June 9, 1880. From this time on, we find no new species introduced, the eggs found in June being, for the most part, second sets. In July fresh eggs are very rare, although they are recorded from the following species: western lark finch, western fly catcher, lazuli bunting, California partridge and mourning dove.

RECENT LITERATURE.

The Atlatle or Spear-Thrower. ZELIA NUTTALL, the well-known archæologist, gives us in vi, No. 3, of the Ethnological papers of the Peabody Museum, a most interesting account of the atlatle or spear-thrower. This instrument, the value and character of which was until now unknown, or misunderstood, consists of a peculiar shaped "handle" for throwing spears and arrows. It was used by the Aztecs at the time of the conquest, and is found pictured in all codices as well as upon the sculptured tablets of Yucatan, Mexico and Central America. Mrs. Nuttall is the first one to ascertain the true character and use of this instrument, with which the Aztecs not only killed their foes and enemies in warfare, but which in their trained hands became the principal weapon of the chase. Before going to war, the young men practiced with it on flying ducks as well as on the fishes of the lakes. Mrs. Nuttall discerns three distinct forms of the atlatle. The one used in the chase and warfare, the one used as an emblem for the gods, heroes and kings; the third form was highly ornamented and used as an emblem in religious ceremonies by the priests. It would have greatly added to the value of the memoir if detailed drawings of the three yet remaining atlatles had been given, as the correct use of the weapon is difficult to understand. G. E.

Description of a New Subspecies of the Eastern Chipmunk, from the Upper Mississippi Region, West of the Great Lakes. By ED-

GAR A. MEARNS, Assistant Surgeon, U. S. A. Bull. Am. Mus. Nat. Hist., iii, 2, Art. xvi. The new race recognized is named *Tamias striatus griseus.*

Description of a New Species of Weazel, and a New Subspecies of the Gray Fox, from Arizona. By EDGAR A. MEARNS., Assistant Surgeon, U. S. A. Bull. Am. Mus. Nat. Hist., iii, 2, Art. xvii. The new forms named are *Putorius arizonensis* (Arizona Weazel), inhabiting the "mountains and high plateau region of Arizona, down to the lower limit of the forest zone of *Pinus ponderosa.*" The species is similar in color to *P. longicauda*, and is one of the smallest weazel. The new variety of fox is named *Urocyon virginianus scottii* (Scott's Fox), inhabiting Southern California, Arizona and western New Mexico, and has been found as far north as Nicasio, Marin County, Cal. Judging from the lucid description it is a very distinct variety of the eastern red fox. W. E. B.

Observations on the North American Badgers, with Especial Reference to the Forms found in Arizona, with Description of a New Subspecies from Northern California. By EDGAR A. MEARNS, Assistant Surgeon, U. S. A. Bull. Am. Mus. Nat. Hist., iii., 2, Art. xviii. The comparative external and cranial characters of the hitherto recognized North American badgers, *Taxidea americana* and *T. americana berlandieri*, are given with considerable fullness, and an intimation of a belief that *T. a. berlandieri* is specifically distinct from *T. americana.* Both of these badgers were found at Fort Verde, Arizona, but were always satisfactorily referable to one or the other of the two forms, although the vertebral stripe was not always continuous in *T. a. berlandieri.* The material at the author's disposal was greater than has been previously examined by other writers; the two southern badgers are left as at present known while a third one is described from northern California (Fort Crook) and probably its range extends into Oregon. The subspecies characterized is *Taxidea americana neglecta.* W. E. B.

Notes on the Otter (Lutra canadensis) and Skunks (Genera Spilogale and Mephitis) of Arizona. By EDGAR A. MEARNS, Assistant Surgeon, U. S. A. Bull. Am. Mus. Nat. Hist., iii, 2, Art. xix. A study of 34 crania of otters from various localities, with three obtained in Arizona by the author, who refrains from naming any new subspecies in the absence of additional material, particularly

skins. *Lutra californica* (page 254) was named by Dr. Gray in 1837, although redescribed by Prof. Baird in vol. viii, P. R.R. Rep., from a specimen from the Cascade Mountains. The subject ends with a description and measurements taken from a freshly-killed specimen from Beaver Creek, Arizona.

A second paper in the same article describes the new subspecies *Spilogale phenax arizonæ* (Arizona Striped Skunk), of which thirteen specimens were examined from the vicinity of Fort Verde, Arizona. Dr. Merriam's type of *S. phenax* came from Nicasio, Cal. The article ends with "A Study of the Arizona Skunks of the Genus Mephitis."

W. E. B.

Notes on New or Little-known North American Mammals, based on recent additions to the Collection of Mammals in the American Museum of Natural History. By J. A. ALLEN. Bull. Am. Mus. Nat. Hist., iii, 2, Art. xx, pp. 263–310. The present paper is based upon a critical examination of several thousand skins, mostly with crania, of mammals received by the American Museum of Natural History during the last four years. The introductory briefly notices some changes in mammalogy since the publication in 1857 of Prof. Baird's great work on North Ammerican Mammals, when less than 3,000 specimens were available for study, a smaller amount than has been collected annually during the past few years.

The MS. name *Heteromys alleni* Coues is revived for a pouched rat ranging from southern Mexico northward to the mouth of the Rio Grande, and distinct from. *H. longicaudatus* of Central America.

An excellent study of the genera Dipodomys and Dipodops is given. Since 1886 the number of species of Dipotomys has increased from two to twelve and been divided into two genera with six species to each. To these Dr. Allen adds *Dipodops ordii palmeri* subsp. nov. from San Luis Potosi, Mexico, and *Dipodops richardsoni* sp. nov. from Indian Territory, and probably extending "over the Plains from northern Texas to southern Wyoming and westward to the Rocky Mountains." *Perognathus (Chætodipus) femoralis* Allen is a new species from Dulzura, San Diego County, Cal.

The long lost species *Neotoma micropus* Baird (Texan Wood Rat) is revived upon the basis of eleven specimens from Brownsville, Texas, which, with those from other localities, made a series of

thirty specimens. The restoration of this species after having escaped the notice of zoologists for thirty-five years is particularly interesting, in the light of what has been written about it as a valid species, and has a deep significance.

Neotoma micropus canescens Allen (Pallid Wood Rat) is a new subspecies from Indian Territory.

The Northwest Coast form of the bushy-tailed wood rat is separated from *N. cinerea* with the name *Neotoma cinerea occidentalis* (Baird).

The Texan Cotton Rat is assigned to *Sigmodon hispidus texianus* (Aud. & Bach). *Oryzomys aquaticus* Allen is a new species from Brownsville, Texas.

The type specimen of *Hesperomys indianus* Wied. was found on examination to be simply a common house mouse (*Mus musculus* Linn).

The white footed mouse is treated of at some length with the result that the generic name Hesperomys is no longer available and the specific name *leucopus* is found to be antedated by *americanus* Kerr. The species now stands as *Vesperimus americanus* (Kerr). Three new species are described under this genus, viz: *V. difficilis*, (Mexico), *V. nasatus* (Colorado), and *V. mearnsii* (Texas).

Observations and critical remarks are given on *Vesperimus americanus sonoriensis* (Leconte), *V. a. nebracensis* (Mearns), *V. a. texanus* (Woodhouse), and *V. a. rufinus* (Merriam), also *Sciurus hudsonius californicus* Allen, *Lepus cinerascens* Allen and *Spilogale indianola* Merriam.

Felis eyra Desm. is recorded from Texas for the first time.

W. E. B.

Nouvelle Correspondance Botanique.—Liste des Botanistes de tous les Pays, et des Etablissements, Sociétés et Journeaux de Botanique: W. ENGELMAN, Leipzig; Librarie Internationale, Paris, 1891.—The American editor, if there was one, of this publication, has reason to think it a remarkable production. The list of botanists of the eastern United States includes many names which have the charm of novelty to most of us, and by way of compensation leaves out a host of others, with which we are more or less familiar. The errors and misstatements in regard to botanical names admitted are also numerous and occasionally amusing. We are glad glad to hear that Dr. A. W. Chapman is "Florist of the Southern

U. St.,'' and that the late Dr. Parry is at St. Louis as "Keeper of the Engelmann Herbarium, Shaw Botanic Garden;'' but we fear the well-known botanical artist of Jamaica Plain will hardly recognize himself as "C. E. Jaxon;'' and as an ostensible English address "Iowa City, Ja., will have a tendency to make the average postal clerk tear his hair and turn with relief to "Snider, Dayton, Ohio,'' or even attempt to hunt up "Dr. J. G. Cooper, Haywood, N. C., (North Carolina)."

The list of Pacific Coast botanists is a mine of new facts, and many of those whose names are inserted will probably see themselves so-styled for the first time. Dr. J. (?) Le Conte is set down as a "Florist;'' Prof. Kleeberger is stationed at Marysville; Mr. and Mrs. Brandegee are relegated to Cañon City, Colorado; the State Mining Bureau, a singular botanist by the way, to Sacramento; while Dr. H. H. Behr, Mrs. J. G. Lemmon, Carl Purdy, C. F. Sonne, W. F. Lyon, H. N. Bolander, L. F. Henderson, Elmer R. Drew, B. F. Leedes and numerous others with far better claims than many in the list are omitted altogether. A good botanical "Address-book" is evidently still to be written.

Notes from a Garden Herbarium—VI. L. H. Bailey, American Garden, August, 1891. In this paper the author writing of the wild crab-apples of America names two new species, *Pirus Soulardi* and *P. Ioensis*. The first of these was introduced into cultivation as a hybrid, and if hybrids can be produced by accident, they can be also by intention; a means of settling such matters which would naturally commend itself to the possessor of a "Garden Herbarium.'' The author seems to be distinctly doubtful of the validity of his own species, and mere garden names would probably have been better suited to them until a more careful examination of their claims to a specific rank could have been made.

Contributions to the Life-Histories of Plants, No. VI. By Thomas Meehan, Proc. Phila. Acad., 1891, 269–283. Of these notes entitled: On the Causes Affecting Variations in *Linaria vulgaris;* On the Self-fertilizing Character of Compositæ; On the Structure of the Flowers in *Dipteracanthus macranthus;* Aerial Roots in *Vitis vulpina;* Additional Note on the Order of Flowering in the Catkins of Willows; Self-Fertilizing Flowers; the second and the last are of especial interest. The author claims, and we

fully agree with him, that the self-fertilization of flowers has been too much neglected in hunting for possible fertilization by means of insects. Among the species in which he considers that fertilization without the aid of insects is the rule, he mentions *Lepachys pinnata*, *Bidens frondosa*, *Portulaca pilosa*, *Cuphea Zimpani* and *Lopezia coronata*.

A comparative Study of the Styles of Compositæ, with four plates. By J. S. CHAMBERLAIN. Bull. Torr. Club, xviii, No. 7. The styles of fifty-five species, representing nearly as many genera and the principal tribes of our Compositæ, are here studied and figured with the hope of inducing teachers to use more generally the characters they furnish, in separating tribes. The work seems to be carefully done, but only one species, as a rule, being studied in each genus, the author fails to notice the often great variation in this respect among the species of many genera.

Contributions from the U. S. National Herbarium, vol. ii, No. 1. *Manual of the Phanerogams and Pteridophytes of Western Texas. Part 1, Polypetalæ.* By JOHN M. COULTER. This is the first part of a manual intended to include all Texan plants west of the ninety-seventh meridian. It is based mainly on the collections and investigations of Mr. G. C. Nealley of Houston, Texas. The completed work will be a great convenience to anyone wishing to know something of the distribution of plants in that region.

Contributions from U. S. National Museum, vol. i, No. iv. *List of Plants collected by Dr. Edward Palmer in 1890 in Western Mexico and Arizona*—1, *Alamos*, 2, *Arizona*. By J. N. ROSE. The collection to which this paper relates includes Nos. 276–751, with ten plates, greatly enhancing the value of the work, which contains many new species, as well as the usual field notes made by the indefatigable collector.

Botanical Gazette, May, 1891. On Raised Peatbogs in New Brunswick: W. F. Ganong. Notes on the Flora of the St. Croix Region (concluded): E. J. Hill. A visit to the West Indies: A. S. Hitchcock. Notes on the Apical Growth of Liverworts (with plate xiii): David M. Mottier. New Grasses, (*Orcuttia Greenii*, *Eragrostis spicata*, *Muhlenbergia Alamosæ*, *Calamagrostis densus*, *Calamagrostis kœlerioides*): George Vasey.

June, 1891. Abnormal Phyllotactic Conditions as shown by the

Leaves or Flowers of Certain Plants (with plate xiv): Aug. E. Foerste. A Study of some Anatomical Characters of North American Gramineæ (with plate xv): Theo. Holm. On the Organization of the Fossil Plants of the Coal Measures: David White. On the Relation between Insects and the Forms and Characters of Flowers: Thomas Meehan. *Coursetia axillaris*, n. sp.: John M. Coulter.

July, 1891. Undescribed Plants from Guatemala, IX (with plates xvi–xviii): John Donnell Smith. On certain new or peculiar North American Hyphomycetes, II (with plates xix–xx): Roland Thaxter. Notes on North American Mosses: Charles Reid Barnes.

Bull. Torrey Club, May, 1881. Common and Conspicuous Algæ of Montana: F. W. Anderson and F. D. Kelsey. *Myriophyllum Farwellii* n. sp.: Thomas Morong. A new Liatris from North Carolina: T. C. Porter. Central Michigan Cyperaceæ: C. F. Wheeler. Two letters on *Pinus Banksiana*. Botanical Notes.

June, 1891. Notes on the Flora of High Altitude in Custer County, Colorado: T. D. A. Cockerell. A Comparative Study of the Styles of Compositæ: J. S. Chamberlain (plates cxvii and cxviii). Notes on the Flora of North Carolina: A. A. Heller.

Flora of the Cape Region of Baja California. By T. S. Brandegee, Proc. Cal. Acad., ser. 2, iii, 108-182. This is a list of plants known to grow in that part of the Lower Californian peninsula south from La Paz and Todos Santos, and is based upon two collecting trips made into that part of the peninsula during the year 1890. The region was botanically unknown excepting what knowledge had been gained from the collections of Xantus, Mr. Hinds of H. M. S. Sulphur, and Dr. Palmer, made near the coast at Cape St. Lucas and La Paz. No collection had previously been made of plants from the mountains and the interior. Nearly seven hundred species are enumerated, including some collected by Dr. Palmer at La Paz, and by Xantus at Cape St. Lucas, that were not found by Mr. Brandegee. The grasses were determined by Dr. George Vasey, the ferns by D. C. Eaton and the mosses by Prof. L. M. Underwood. Many new species are described and others are accompanied by field or structural notes. F. H. V.

A Provisional Host-Index of the Fungi of the United States, Part III. By W. G. Farlow and A. B. Seymour, Cambridge, June, 1891. This part, pp. 135–219, embracing Endogenous,

Gymnospermous and Cryptogamic host-plants; animal hosts, and addenda, etc., with Generic index, concludes this work, the value of which to systematic mycologists is in no danger of being overestimated. H. W. H.

Journal of Mycology, vol. vi, No. 4, Washington, 1891. This number completes the volume. It contains Treatment of Pear Leaf-blight and Scab in the Orchard by B. T. Galloway and D. G. Fairchild; The Peach Rosette, with plates viii–xiii, by Erwin F. Smith; Tuberculosis of the Olive, with plates xiv, xv, by Newton B. Pierce; Recent Investigations of Smut Fungi and Smut Diseases by Dr. Oskar Brefeld, translated by Erwin F. Smith; Ripe Rot of Grapes and Apples (with plate xvi), by Effie A. Southworth; Anthracnose of Cotton (with plates xvii, xviii), by George F. Atkinson; Mycological Notes, II, by George Massee; Index to North American Mycological Literature, by David G. Fairchild.

PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *May 4, 1891.* President Harkness in the chair.

Donations to the museum were reported from Frank H. Vaslit, B. C. Winston, Walter E. Bryant, J. A. Barr, G. P. Rixford, H. H. Behr, Robert Moses, H. S. Nichols, William A. Robbins and L. Belding.

The Librarian reported 373 additions to the library.

Mr. G. P. Rixford read a paper on Indian carvings at Swansea, Inyo County, and presented a series of photographs of the carvings.

Mr. E. J. Molera announced the recent death of General Carlos Ibañez, Count of Mulhacen, President of the International Geodetical and Statistical Societies, and President of the International Board of Weights and Measures, and read a notice of his life and works.

Professor Carl Lumholtz read a paper on his recent explorations in Mexico, giving his experience and discoveries in the hitherto unexplored Sierra Madre country.

A vote of thanks was tendered to Mr. Lumholtz for his interesting paper.

The President made a few remarks concerning the death of Pro-

essor John LeConte, and Mr. T. H. Hittell and Gen. J. F. Houghton were appointed a committee to draft resolutions of respect and condolence.

June 1, 1891. President Harkness in the chair.

Donations to the museum were reported from William Ryan, Walter E. Bryant, Mrs. J. Lawley, Adolph T. W. Erzgraber, Dr. J. G. Cooper, J. R. Chalker, Miss Alice Eastwood, Dr. E. S. Clark and Mrs. R. A. A. Wright.

The Librarian reported 443 additions to the library, calling particular attention to the donation by Dr. Gustav Eisen, of 279 books and pamphlets on geology, zoology, anatomy and botany.

A vote of thanks was tendered to Dr. Eisen for his valuable donation.

Lieutenant John P. Finley read a paper on the Hot Winds of California, illustrated with numerous maps and charts.

Specimens of opals in the matrix from Mexico, Australia and Hungary, presented by Melville Atwood, were exhibited and a short paper on opals by Mr. Atwood was read.

Mr. T. H. Hittell read the following memorial of the late Professor John Le Conte:

A great man and an honored member of this Academy has passed away from amongst us—a man loved by all who knew him for the kindness and geniality of his disposition, revered for the elevation and purity of his character and eminent for the breadth and depth of his scientific and scholarly attainments. Professor John Le Conte, of the University of California, closed his long and honorable career at Berkeley on April 29, 1891. He was born in Liberty County, Georgia, on December 4, 1818, and was consequently seventy-two years and a few months old at the time of his death. He received a preparatory training under the tuition of the celebrated Alexander H. Stephens, and in 1835 entered Franklyn College, afterwards known as the University of Georgia, where he graduated with high honors in 1838.

From an early age he manifested a remarkable taste for scientific subjects, and in college exhibited a decided preference for those branches of study which were connected with nature and physics. Almost immediately after graduation he proceeded northward, entered the College of Physicians and Surgeons of the University of New York, and received from that institution the degree of M. D. in

March, 1841. He then returned to his native State and married a lady of beauty and refinement who survives him as his widow. He commenced the practice of medicine at Savannah, where he remained until August, 1846, when he was elected to the chair of natural philosophy and chemistry in Franklyn College, his *alma mater*. From that time he abandoned the practice of medicine and devoted himself to the study of the physical sciences. In 1855 he became lecturer on chemistry, in the College of Physicians and Surgeons in the University of New York—thus reaching a chair in his second *alma mater*, as he had previously reached a chair in his first.

In 1856 he accepted a call to fill the professorship of natural and mechanical philosophy in the University of South Carolina and remained there until the spring of 1869, when he was called to the chair of physics in our own University of California. He was almost immediately upon his arrival in this State appointed acting president of the University, and as such initiated the first exercises of that institution. In 1870, after the election of Dr. Durant as president, and for several years thereafter, Dr. Le Conte gave himself up exclusively to the duties connected with his professorship; but in 1875, after the resignation of Dr. Gilman, he was again appointed to act as president, and in 1876 was elected to the office of president. He continued to fill the office of president for a year and a half, since which time, and to the time of his death, he occupied the chair of physics.

Professor Le Conte became a member of this Academy on August 3, 1870, and a life member on January 3, 1888. He was also a member of the National Academy of Sciences and of many other scientific societies in this country and Europe. He wrote many valuable and important papers on scientific subjects, and particularly on subjects connected with the phenomena of the vibrations of sound, on the astronomy of Mars and its satellites, on the famous nobular hypothesis, on the evolutions of worlds, and on various other matters whereby glimpses are gained into that world of truth called nature, the knowledge of which is destined to emancipate humanity from the shackles of ignorance and superstition, and all the innumerable ills connected with and involved in those immeasurable evils.

About the end of the last century, the great German philosopher

Fichte wrote a treatise on the subject of The Scholar, in which he represented the avocation of the genuine student of truth as the grandest and sublimest occupation of the human mind. In perusing his book, the reader by degrees becomes almost as enthusiastic as the writer was, and feels in every part of his sensitive system the verity of what the philosopher set forth. The glories of conquest and empire, the pride of kings, presidents and politicians, the glamor of family and wealth, all pass away. They are vanities. They are nothing. But what the scholar accomplishes endures and advances the race in the path of civilization and culture. In these days, quite as certainly as a hundred years ago, there is no greater man than the scholar, and among the scholars of California no one, perhaps, made a nearer approach to the character contemplated by the philosopher than our late honored member, Professor John Le Conte.

THEODORE H. HITTELL.
JAMES F. HOUGHTON.

July 6, 1891. President Harkness in the chair.

Donations to the museum were reported from the following: L. Belding, W. S. Bliss, W. E. Bryant, Miss Alice Eastwood, W. J. Golcher, R. C. McGregor.

The Librarian reported 129 additions to the library.

The President announced the death of the following members: Henry Edwards, Charles Stephens, E. J. de Santa Marina.

Dr. David Wooster read a paper on Stone Heaps in Arizona.

Dr. H. H. Behr read a paper on a New Remedy for Snake Bites.

CALIFORNIA BOTANICAL CLUB. *May 21, 1891.* The President in the chair.

Dr. Behr read a paper on the benefits to be derived from a botanic garden. He called attention to the fact that countries of much more recent settlement than ours were far in advance of us in such respects, citing particularly the Australian colonies. The great value of such gardens in the study of botany and the introduction and acclimatization of beautiful and valuable plants was pointed out.

The speaker enlarged upon the use of such a garden, where nearly related plants might be cultivated under similar conditions, and the degree of their relationship determined, and related some amusing anecdotes of certain botanists of the last generation who

were much given to species-making till convinced of error by cultivation of their plants.

Mr. H. T. Bickel read a short paper on the "Pronunciation of Scientific Names" and gave instances of peculiar pronunciation.

Mr. T. S. Brandegee read an account of his recent botanizing trip in the Tehachapi Mountains.

Dr. H. W. Harkness exhibited specimens of galls and described their formation and the extraordinary deformities sometimes caused by them.

July 16, 1891. Vice President Mrs. Mary W. Kincaid in the chair.

The following were elected to membership: Dr. C. L. Anderson, J. J. B. Argenti, Lyman Belding, Walter D. Bliss, J. W. Congdon, W. C. Cusick, Miss Clara G. Dolliver, Mrs. Emma Douglas, Miss Emily Edmunds, Mrs. W. B. Ewer, Miss Mary Grant, Miss Isabel L. Grant, Dr. V. Havard, Prof. T. L. Heaton, Miss Catherine H. Hittell, Thomas Howell, J. M. Hutchings, F. O. Johnson, Hon. W. W. Morrow, Mrs. W. W. Morrow, Miss Maud Morrow, Rev. J. C. Nevin, Dr. Edward Palmer, Mrs. Mary O. Stanton, Charles H. Townsend, Mrs. J. Renshaw Wilson.

Mr. T. S. Brandegee read a paper on "The Cactus Family," their peculiar forms, distribution and mode of dissemination and the uses to which they are put by the inhabitants of the treeless regions of Lower California. The fruit of *Cereus Thurberi* known as "pitahaya dulce" was highly praised. Attention was directed to their leaves and a Lower Californian species on which they are very conspicuous was described. The spreading of certain Opuntias by means of sterile fruits, brittle joints, barbed spines, etc., was explained.

NOTES.

Charles V. Piper in Garden and Forest, iv, 181, writes concerning the Conifers of Mount Rainer—now usually called Mt. Tacoma—and in an appended note the editor remarks: "Our correspondent's discovery of *Abies nobilis* on Mount Ranier extends the northern range of the species, not known before north of the Columbia River, very considerably." This is an oversight, as *Abies nobilis* was collected by the botanists of the Northern Transcontinental

Survey in the same region, and Frank Tweedy published the fact in "Notes on the Coniferæ of Washington Territory" in Bull. Torr. Club, April, 1883.

POPULUS MONTICOLA, a new species of Poplar from the mountains of Lower California, forms fig. 56 (vol. iv, 329) of Garden and Forest.

Fig. 59 of Garden and Forest is a portrait of *Pinus cembroides* in the form in which it occurs on the mountains of the Cape Region of Lower California.

The careful study of mammals and other vertebrates when kept in captivity has always been interesting and instructive, as well as productive of important facts, when the investigations were intelligently conducted. The Golden Gate Park, San Francisco, has already the nucleus of a fine zoölogical garden, and a "buffalo" farm has been established near Monterey; both of these places, however, are mainly devoted to the larger ungulates, which few, as individuals, can undertake to care for. Probably Judge Caton has profited more from the study of captive deer than any one else; at least his work upon the American deer is without a rival.

We are pleased to note the establishment of a zoölogical experiment station by Messrs. Chas. A. Keeler and Walter E. Bryant, to be located at Berkeley, for the purpose of ascertaining new facts in the life histories of animals, especially mammals, and for the study of the phylogenetic relationship of certain varieties. The living specimens with which to carry on this work are much desired.

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